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Social skills intervention efficacy: Child factors that predict the success of intervention  
with preschool-age children at-risk for ADHD

by

Katharine Reilly

Presented to the Graduate and Research Committee  
of Lehigh University  
in Candidacy for the Degree of  
Doctor of Philosophy  
in  
School Psychology

Lehigh University

May 2013

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May 2013

## Approval page

Approved and recommended for acceptance as a dissertation in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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## Acknowledgements

Sincere thanks and utmost respect must be given to the following:

Dr. Shapiro, for your advice, questioning, encouragement, editing, and support throughout my years at Lehigh.

Dr. DuPaul and Dr. Kern, for the opportunities to work on such rewarding research.

The rest of the staff at Project Achieve, for the support and teamwork.

Dr. Caskie and Dr. Manz, for your suggestions and assistance.

Mom and Dad, for being role models of balancing family, education, and work, and for the expectations of excellence.

Mary, for the inspiration to begin the journey.

Emma and Owen, for all the wonderful distractions along the way.

Steve, as in running, for being by my side in the sprint to the finish.

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## **Abstract**

The present study investigated the predictors of treatment efficacy of an early intervention for young children at-risk for diagnosis of ADHD. Initial analyses of these data investigated differences in growth over time between those children who received a multi-setting, multi-component intervention and those whose parents participated in a general parent education program, revealing that both groups exhibited equivalent improvements over the first year of a two-year intervention and one-year post-intervention follow-up. Due to the counterintuitive nature of these findings, further investigation exploring individual predictors of treatment efficacy was conducted. Analysis of both observational measures and informant reports following the full two-year intervention and one-year post-intervention follow-up also failed to demonstrate treatment group effects, with both the multi-setting, multi-component intervention and parent education groups exhibiting significant rates of improvement on all dependent measures. Similarly, the majority of analyses investigating individual factors that could influence intervention efficacy, such as comorbid Oppositional Defiant Disorder (ODD), observation of aggression at baseline, and age at enrollment, revealed significant improvements over time but no group differences. Two models demonstrated both group differences at baseline and in growth rate: comparison between preschoolers with and without comorbid ODD on parent ratings of social skills, and comparison between preschoolers who did and did not exhibit aggression at baseline on subsequent levels of aggression. Overall, despite the failure to discover group differences, the slopes for those models that reached significance were in the direction of improvement: decreases in observed antisocial behavior and increases in informant ratings of social skills.



## **Chapter 1**

### **Statement of the Problem**

Between 3-7% of school age children are estimated to have Attention-Deficit Hyperactivity Disorder (ADHD), representing as much as 50% of all referrals to child psychiatry clinics (American Psychological Association, 2000; Cantwell, 1996). ADHD is marked by three hallmark characteristics: inattention, hyperactivity, and impulsivity. Of these, inattention and impulsivity appear to produce deficits and excesses in social performance, through a failure to attend to pertinent details, respond to stimuli, and regulate behavior (Colton & Sheridan, 1998; Dumas, 1998; Hay, Hudson, & Liang, 2010).

Scores on measures of social skills discriminate between ADHD and control groups with a high degree of accuracy (Merrell & Wolfe, 1998), with a correlation between social competence deficits and ADHD symptom severity. As the number and intensity of ADHD symptoms increases, parallel increases in antisocial behavior and decreases in positive social interactions follow (Kaiser, McBurnett, & Pfiffner, 2011; Merrell & Boelter, 2001). Further, social competence deficits are a common feature of a majority of children diagnosed with ADHD. Over 50% of children diagnosed with ADHD demonstrate problematic peer interactions (Guevremont & Dumas, 1994). The design and implementation of effective intervention to address these patterns of social difficulty are imperative, as these deficits pose a threat to positive social development and academic achievement. Without intervention, social difficulties and peer rejection persist over time and setting (Molina, Hinshaw, Swanson, Arnold, Vitiello, Jenson, Epstein, et al., 2009; Colton & Sheridan, 1998; Landau & Milich, 1990).

Chronic social problems in childhood have been demonstrated to be one of the most powerful predictors of negative adjustment later in life (Lee, Lahey, Owens, & Hinshaw, 2007; Pierce, Ewing, & Campbell, 1999; Parker & Asher, 1987; Cowen, Pederson, Babigan, Izzo, & Trost, 1973). Children with chronic social problems exhibit an increased risk for dropping out of school, engaging in delinquent or criminal behavior, and developing mental health difficulties (Bagwell, Schmidt, Newcomb, & Bukowski, 2001). Further, children with ADHD appear to be less attentive and responsive to the feedback from peers and adults that occur naturally in the course of social interactions. When compared to their peers, children diagnosed with ADHD benefit less from natural social experience, indicating the need for explicit intervention in this area (Colton & Sheridan, 1998). Unfortunately, a comprehensive review of the literature on intervention for ADHD in preschool-age children revealed that much more research is conducted on pharmacological approaches than on behavioral approaches (Ghuman, Arnold, & Anthony, 2008). Further, of the behavioral approaches, many specialized interventions designed to improve the social skills and interactions of children with ADHD have met with only limited success.

### **Efficacy of Interventions for Social Competence for Children with ADHD**

Social skills training is frequently implemented in order to address these patterns of social competence deficits (Frankel, Myatt, Cantwell, & Feinberg, 1997). The rationale for the design of these models is that explicit, direct instruction in the skills underlying social competence will increase positive peer relationships and group acceptance (Mathur, Kavale, Quinn, Forness, & Rutherford, 1998). This method of intervention delivery typically involves skill identification, modeling, practice, and

reinforcement (Mathur, et al., 1998). Although models based on this principle have been effective in addressing the social challenges associated with internalizing disorders (Frankel, et al., 1997), two meta-analyses of social skills interventions provide evidence that traditional social skills training is not effective for children with emotional or behavioral disorders (Mathur et al., 1998; Quinn, Kavale, Mathur, Rutherford, & Forness, 1999).

Quinn and colleagues (1999) reviewed 35 group-design studies investigating the effects of social skills training for students with emotional-behavioral disorders, discovering only a small pooled effect size of .0199. In fact, 27% of the effect size measurements were negative, indicating that a full quarter of studies found greater improvements in the non-intervention group. Further, they discovered no differences in effect size based on intervention type, duration of intervention, research quality, age of participants, and rater of the independent variable.

Similarly, Mathur and colleagues (1998) reviewed 64 single-subject studies that sought to implement social skills training for students with autism, emotional/behavioral disorders, or involvement in the juvenile justice system, also demonstrating only minimal treatment effectiveness. The mean percentage of non-overlapping data points was 62% with a large standard deviation of 33%. No relationship between length of instruction and treatment efficacy was found, corroborating the findings of Quinn and colleagues (1999).

Although Mathur and colleagues (1998) predicted a larger effect for younger, preschool-age children, as a result of targeting behaviors prior to significant social reinforcement, their results indicated weaker effects for this group. Two explanations

exist for this unexpected finding. First, as noted by the authors, many interventions may not be adapted to developmentally appropriate levels for these youngest students. Second, and not noted by the authors, is the possible relationship between category of emotional/behavior problems and age. Unlike the previous investigation (Quinn et al., 1999), Mathur and colleagues (1998) investigated a population of children with a greater variety of emotional or behavioral problems, finding that children with autism were significantly less likely to benefit from social skills training than children with emotional-behavioral disorders or children identified as delinquent. It appears to be more likely that preschool students would be diagnosed with autism, rather than emotional-behavioral disorders or juvenile justice system involvement, although the authors do not refer to any significant overlap between age and category of disorder.

Although the previous investigations reviewed the effectiveness of social skills training with children with emotional or behavior disorders in general, the evidence for these models with children diagnosed with ADHD specifically are no more hopeful. Antshel and Remer (2003) implemented an eight-week social skills training for eight to 12-year old children with ADHD. They discovered improvements in parent ratings on the Assertion subscale of the *Social Skills Rating System*; however, other measures of other social competence did not demonstrate statistical significance. It is questionable whether increases in assertion indicate gains in social competence for children with ADHD; therefore, the effectiveness of traditional training models for children with ADHD is limited.

A number of potential explanations exist for the failure of social skills training programs to promote significant and socially valid improvements. Although many

programs make minor efforts toward generalization of new skills, these efforts are insufficient to elicit change in children's natural social contexts (Gresham, Sugai, & Horner, 2001). For example, programming for generalization in some studies has included parent newsletters and brief parent education (Frankel, Myatt, Cantwell, & Feinberg, 1996; Pfiffner & McBurnett, 1997). Indeed, a few investigations exploring multi-component interventions including direct skills instruction revealed some improvements; however, the degree to which these gains are due to social skill instruction specifically cannot be extricated (Scott, Sylva, Doolan, Price, Jacobs, Crooks, & Landau, 2010; Webster-Stratton, Reid, & Beauchaine, 2011). Further, a significant proportion of empirical investigations of social skills training fail to measure change in more than one environment or corroborate reported change with direct observations, much less provide coordinated intervention across multiple settings (Caldarella & Merrell, 1997).

The content and focus of social skills training has also been cited as a reason for their ineffectiveness with specific populations. Gresham, Sugai, and Horner (2001) assert that social skills training fails to individually assess and design intervention for children with deficits in skill acquisition, performance, or fluency. Further, social skills training often ignores the importance of decreasing challenging behaviors in conjunction with increasing pro-social behaviors, fails to connect assessment and interventions, and provides intervention too temporally removed from the expression of social deficit (Gresham et al., 2001). Caldarella and Merrell (1997) assert that, in order to be successful, social skills interventions for children with ADHD need to incorporate aspects addressing peer relations, self-management, academics, compliance, and assertion. Due to the negative long-term consequences of early aggression in children with

hyperactivity, Stormont (2001) further supports a function-based approach, specifically considering the antecedents and consequences surrounding aggressive behavior. As multi-setting approaches have been demonstrated to be most effective for children with ADHD, social skill intervention must address the family, the school, and the child (Cantwell, 1996).

In an investigation of the utility of such a consultative model, providing intervention at the time of behavior by those individuals naturally in a child's environment, with three school-age children diagnosed with ADHD, Colton and Sheridan (1998) demonstrated improvements in positive peer interactions and parent and teacher ratings of social skills. Although not strict a consultation approach, Sheridan, Dee, Morgan, McCormick, and Walker (1996) incorporated parent-implemented intervention and immediate feedback in an intervention model designed to address the social skill deficits of five school-age children diagnosed with ADHD. This approach resulted in improvements in parent and teacher ratings of behavior and social skills. The incorporation of interviews in the consultative model may improve the identification of target behavior, the individualization of interventions, and in turn, improve outcomes. Moderate correlations have been demonstrated between teacher ratings of social skills and structured interviews; however, these differences led to low correlations between the two measures on the classification of preschool children into "at-risk" or "not at risk" categories (Bramlett, Dielmann, & Smithson, 1999). Thus a more individualized approach to screening and intervention is necessary.

Exploring the efficacy of a multi-setting consultation model, although targeting academically-oriented dependent measures, Murraray, Rabiner, Schulte, and Newitt

(2008) implemented a four-month intervention with a population of elementary students from kindergarten through fifth grade, with both ADHD and classroom impairment. Following the use of a daily report card and conjoint behavioral consultation with parents and teachers, increases in academic productivity and academic skills were evident, compared to a non-intervention control group; however, participants continued to demonstrate impairment, remaining above the clinical threshold.

Despite the effectiveness of these studies, certain limitations to the generalization of their findings exist. First, as single-subject research studies, both Colton and Sheridan (1998) and Sheridan and colleagues (1996) investigated their intervention packages on a limited number of participants. Second, the age range of participants in these studies was 8 to 10 years; it is unknown whether consultation with the parents and teachers of preschool-aged children at-risk for ADHD will be as effective. Finally, neither of these approaches to increasing social competency addresses the function of competing behaviors, a factor deemed to be of high importance in developing effective interventions (Gresham et al., 2001).

### **Importance of Early Identification and Intervention**

Additional research to investigate effective intervention to prevent the chronic social difficulties associated with ADHD is clearly essential. An emphasis on early identification and intervention to avoid these associated difficulties is paramount, as longitudinal data indicate that interventions to address disruptive behaviors after age eight serve only to “manage” rather than “remediate” these patterns of behavior (Kazdin, 1987 in Gresham, Sugai, & Horner, 2001).

Older children receiving treatment, in a sample ranging in age from five to 16, were found to have significantly greater impairments in parent-rated social skills (Booster, DuPaul, Eiraldi, & Power, 2012). In a longitudinal study of children nominated as “hard to manage” at age three, those children whose behavior had improved by age six did not demonstrate significant differences from control group (Campbell & Ewing, 1990). In contrast, a majority of children who continued to display clinically significant problems at age six met criteria for an externalizing disorder at ages nine and 13 (Pierce, Ewing, & Campbell, 1998; Campbell & Ewing, 1990). With regard to social skills, specifically, Merrell and Wolfe (1998) revealed significant differences between kindergarten-age children with substantial ADHD characteristics and a comparison group. Deficits were demonstrated in all social skill areas measured, with particular weaknesses found in social cooperation skills. Although concerns regarding differential diagnosis between developmentally appropriate preschool behavior and the constellation of behaviors said to represent “true” ADHD, a focus on severity of behavior may elucidate this distinction (Cantwell, 1996). Behaviors such as temper tantrums, noncompliance, and aggression in preschool children are associated with a persistent course of ADHD over time (Cantwell, 1996).

When considering the specific population of preschool-aged children with ADHD, additional explanations exist for the failures of social skills training to bring about meaningful changes. A failure to alter the content of these programs for the developmental level of preschoolers has been cited as a significant reason for the failure of these interventions for young children with emotional or behavioral disorders (Mathur et al., 1998) and ADHD specifically (McGoey, Eckert, & DuPaul, 2002). Rajwan,



Chacko, and Moeller (2012) further offer that preschool-aged children do not possess the cognitive-developmental skills to successfully participate in direct intervention.

McGoey, Eckert, and DuPaul (2002) reviewed the unfortunately small body of literature on general treatment approaches for preschool children with ADHD, and found that three interventions (stimulant medication, parent training, and classroom behavior management) were effective in improving the symptomatic behavior of these young children. Clearly, then, successful interventions to improve the behavior of young children at-risk for ADHD can be implemented; interventions to improve the social skills of these children must follow.

An investigation comparing two interventions for preschool-age children at risk for ADHD by Kern, DuPaul, Volpe, Sokol, Lutz, Arbolino, and colleagues (2007) revealed no group differences on measures of social skills, among other dependent variables, following the first year of a two-year intervention. Unlike previous investigations that revealed the ineffectiveness of interventions to address social skills deficits in children with challenging behaviors, Kern and colleagues discovered equally significant improvements in both an intense multi-setting intervention and a general parent education intervention. Children and families who received either a) a multi-component intervention including parent education, functional behavior assessment, and individual intervention in the home and school or b) general parent education, exhibited equivalent growth over time on teacher and parent ratings on the *Social Skills Rating System* (SSRS). This lack of group differences was attributed to the following factors: a) many parents did not receive the full intervention, b) group differences may emerge after a longer duration of intervention, c) parents may have discontinued intervention after

seeing behavioral improvement, or d) the interventions were equally effective. These findings contradict the hypotheses of Cantwell (1996), Caldarella and Merrell (1997), and Gresham and colleagues (2001), regarding effective intervention for social skills in children with ADHD, in that the general parent education did not aim to target specific behaviors, intervene across settings, provide intervention at the time of behavior, individualize intervention, or program for generalization.

Although these unexpected results are welcome in that at-risk children derived benefit from a community control intervention, the failure of the intense, multi-setting intervention to elicit a greater effect is startling. Prior to accepting the explanations for the similarity between groups on informant rating scales as offered by Kern and colleagues (2007), it is necessary to analyze the yet unexplored remaining data collected via direct observation of classroom behavior. Areas of data yet to be investigated from this project are direct observational data, collected at baseline and then at six-month intervals throughout the duration of the study. Many rating scales with demonstrated strong psychometric properties provide valuable input in the assessment of children's behavior (Merrell, 2000). Specific to the assessment of behavioral difficulties, rating scales have been termed an "integral" aspect in diagnosing Attention-Deficit Hyperactivity Disorder, Conduct Disorder, Oppositional Defiant Disorder, and other behavior disorders (Lett & Kamphaus, 1992). Rating scales are efficient, economical, and require little training, allowing for the comparison of behavior to that of a normative group and the discrimination of clinical and normal children (Eyeberg, 1985; Lett & Kamphaus, 1992; McConaughy, 1993; McEvoy et al. 2003; Nolan & Gadow, 1994; Kenney et al., 2004). Further, the use of behavior rating scales allows for the collection

of data regarding target behaviors that occur at low frequencies, such as aggressive acts, as teachers or parents have a broader range of opportunities to observe children's behavior (Lett & Kamphaus, 1992; Kenney et al., 2004; McEvoy et al., 2003).

Despite these strengths, rating scales ought not to be the sole measure of behavioral assessment and monitoring. Rating scales are subject to bias and error, which may be exacerbated in those intervention studies in which the informants are also participants in the intervention as parents and teachers (Jones, Daley, Hutchings, Bywater & Eames, 2008; Murray, Rabiner, Schulte, & Newitt, 2008). Such effects can include halo effects, recency effects, saliency effects, gender role stereotypes, misinterpretation of scale items, the tendency to avoid selecting the extremes on a response scale, and regression to the mean (Lett & Kamphaus, 1992; McConaughy, 1993; Merrell, 2000; McEvoy et al., 2003; Nolan & Gadow, 1994). Ultimately, these factors may result in apparent change or improvement when there has been none, or a failure to measure actual change when it has occurred (Cost & Simpson, 2004).

In contrast, when rating scales are used in concert with direct observation of children in the natural setting of their behavior, more reliable assessment of challenging behavior can be conducted. Widely considered to be the ideal validity criterion, inter-rater reliability has been consistently demonstrated correlations greater than 0.80, and more typically in the 0.90 range, when observation data are collected by trained observers with clear operational definitions of target behavior, (Casper & Erickson, 1984; Cost & Simpson, 2004; Kenney et al., 2004; Lett & Kamphaus, 1992). Direct observation allows data to be collected at the moment of occurrence, thus decreasing the reliance of rating scales on memory, and by a neutral rater, thus decreasing bias effects (Kenney et al.,

2004; Lett & Kamphaus, 1992). Further, observers have the unique opportunity to attend solely to the behavior of the target child, unlike teachers and parents who must attend to additional responsibilities in the setting (Kazdin, Esveltd-Dawson, & Loar, 1983). Although not an entirely perfect system of data collection, many of the weaknesses of direct observations are reduced when observing preschool aged children, including decreases in negative behaviors in the presence of a novel adult (McEvoy et al., 2003). Utilizing a combination of rating scales and direct observation across settings is considered to be best practice for the assessment of ADHD (Barkley, 2006). Further, rating scales and direct observations may be measuring unique facets of the social skills of preschoolers at risk for ADHD (Thomas, Shapiro, DuPaul, Lutz, & Kern, 2011). In comparing the results of free play observations and teacher ratings on the *Social Skills Rating System* (SSRS), teacher ratings of social skills correlated with observations of aggressive behavior; however, rating scales did not explain significant variance in free play observations, and observations did not explain significant variance in teacher ratings (Thomas et al., 2011).

Further analysis of the data is necessary in order to explore individual factors that could account for the lack of group differences between intervention groups. Such factors that have an empirical basis for consideration include the presence of comorbid diagnoses, level of aggression observed at enrollment, and age at the onset of intervention. Further, exploration of group differences into the post-intervention year can be investigated.

Response to the intervention approaches may have been tempered by the severity of specific behaviors reported or observed at the onset of the intervention. Children with

ADHD as well as high levels of aggression or Oppositional Defiant Disorder have been found to demonstrate attributional and behavioral difficulties beyond those exhibited by those diagnosed with ADHD alone. They are observed to display more negative responding and intense venting (Melnick & Hinshaw, 2000), engage in more rule violating behavior and encourage their peers to engage in more antisocial behavior (Bagwell & Coie, 2004). In contrast, non-aggressive boys exhibited greater positive engagement, reciprocity, and on-task behavior (Bagwell & Coie, 2004). Boys who were diagnosed with ADHD and who engaged in high levels of aggression overestimate their social abilities and behavior (Hoza, Pelham, Dobbs, Sarno Owens, & Pillow, 2002). This combination of high aggression and over-estimation was then found to lead to further increases in aggressive behavior over time (Brendgen, Vitaro, Turgeon, Poulin, & Wanner, 2004). Preschool-age boys diagnosed with both ADHD and ODD are more likely to generate aggressive solutions to problems; their hostile attributions in turn predicted diagnostic status over time (Coy, Speltz, DeKlyen, & Jones, 2001). The distinctions in the literature between the behaviors and attributions of children with ADHD alone and ADHD in combination with more extensive behavioral difficulties may indicate the need for varying intensities of intervention.

As McGoeey and colleagues (2002) have demonstrated, little evaluation of intervention outcomes of preschool-age children has occurred. The significant developmental changes that occur within the age range at enrollment in the Kern and colleagues' (2007) study may have affected children's responses to the intervention approaches. These youngest participants possess a shorter reinforcement history for their challenging behaviors and interact in environments with less intense expectations for

behavior (Kern et al., 2007; Reid & Eddy, 2002). By the time they reach school age, children with ADHD are already beginning to exhibit some of the associated secondary difficulties. Children in kindergarten who exhibit high levels of ADHD symptoms, similar to the population in the Kern and colleagues (2007) and DuPaul and colleagues (in press) studies, already exhibit significantly weaker social skills than a comparison group (Merrell & Wolfe, 1998). The period for intervention to address these behaviors may be somewhat limited, given reports that, after age eight, behaviors can only be “managed” rather than “remediated” (Kazdin, 1987 in Gresham, Sugai, & Horner, 2001). Therefore, intervention at the youngest range of a preschool population may be the most effective. Intervention with parents, in particular, at this early developmental stage, prior to the development of secondary difficulties such as academic failure and more significant conduct problems, offers promise (Daley, Jones, Hutchings, & Thompson, 2009).

### **Purpose of Study**

The present investigation seeks to further explore the effect of multi-setting, functional assessment-driven intervention, implemented through a multi-component model (MCI), and a parent education group (PE) for preschool and kindergarten students at-risk for ADHD, on not only parent and teacher reports of social skills, but also on classroom-based observations of social interactions. These intervention outcomes will first be evaluated to expand the investigations of Kern and colleagues’ (2007) and DuPaul and colleagues’ (in press) to the post-intervention follow-up year. Next, the effect of individual factors will be considered, including the presence of co-morbid diagnoses, level of aggression observed at enrollment, and age at the onset of

intervention. It is hypothesized that the children who participated in the MCI intervention will demonstrate greater rates of improvement in their observed and reported behaviors, in comparison to the PE group. Further, those participants who were younger at enrollment, and who did not meet criteria for Oppositional Defiant Disorder (ODD) or exhibit aggression at baseline data collection, will demonstrate greater rates of improvement over time.

*Research question 1:* What is the predictive value of intervention group on behavioral observations of at-risk preschoolers' social interactions during unstructured activities in the school setting, and on parent and teacher ratings of their social skills?

*Hypothesis 1:* The children who participated in the MCI intervention will demonstrate fewer antisocial behaviors over time, including negative verbal, negative physical, and disruptive behaviors, in their social interactions with peers, in comparison to the PE group. Participants in the MCI intervention will be rated as demonstrating greater increases in parent- and teacher-rated social skills over time, in comparison to the PE group.

*Research Question 2:* What is the predictive value of initial ODD status, on behavioral observations of at-risk preschoolers' social interactions during unstructured activities in the school setting, and on parent and teacher ratings of their social skills?

*Hypothesis 2:* Those children with ADHD alone at the time of their enrollment will demonstrate fewer antisocial behaviors over time, including negative verbal, negative physical, and disruptive behaviors in their social interactions with peers, in comparison to those students with ADHD and ODD. Children with ADHD

alone will demonstrate greater change over time on parent and teacher ratings on the SSRS.

*Research Question 3:* What is the predictive value of level of observed aggression at baseline, on behavioral observations of at-risk preschoolers' social interactions during unstructured activities in the school setting, and on parent and teacher ratings of their social skills?

*Hypothesis 3:* Those children who did not exhibit aggressive behavior during baseline observation, will demonstrate fewer antisocial behaviors over time, including negative verbal, negative physical, and disruptive behaviors, in their social interactions with peers, in comparison to those who displayed aggressive behavior. Children who did not exhibit aggression at baseline will demonstrate greater change over time on parent and teacher ratings on the SSRS.

*Research Question 4:* What is the predictive value of age at enrollment on behavioral observations of at-risk preschoolers' social interactions during unstructured activities in the school setting, and on parent and teacher ratings of their social skills?

*Hypothesis 4:* Those children who were younger at enrollment will demonstrate fewer antisocial behaviors over time, including negative verbal, negative physical, and disruptive behaviors, in their social interactions with peers, in comparison to older children. The younger children will demonstrate greater change over time on parent and teacher ratings on the SSRS.



## **Chapter 2**

### **Social Difficulties Associated with ADHD**

The theoretical perspective believed to explain the social difficulties experienced by children with Attention-Deficit/Hyperactivity Disorder (ADHD) is essential in that it drives intervention design. Deficits in social cognition have been proposed to underlie the social difficulties experienced by children with ADHD. Two models (Dodge, 1986; Barkley, 1997) offer divergent explanations for this relationship. The earlier model (Dodge, 1986) theorizes that children must successfully execute four distinct steps prior to engaging in socially appropriate behaviors (Matthys, Cuperus, & von Engeland, 1999). First, they must encode social cues in the environment accurately. Then, they must represent and interpret these cues accurately. Finally, they must search their available options for responding, and then select a given behavior as a reaction. A failure to execute any one of these steps will lead to socially inappropriate responding or deviant behavior (Matthys et al., 1999). The Barkley model (1997), in contrast, poses that a failure to inhibit behavior underlies impairments in memory, self-regulation of affect and arousal, and internalization of speech (Wu, Anderson, & Castiello, 2002). These resulting impairments, in turn, result in general deficits in self-regulation and functioning (Wu et al., 2002).

Clear logical connections exist between the diagnosis of ADHD and social cognitive deficits, such as the diagnostic criteria of not listening when spoken to, being easily distracted by extraneous stimuli, and often failing to give close attention to details (APA, 2000). Additionally, a number of studies have investigated the relationship between disruptive behaviors in general, aggressive behaviors, ADHD, or Oppositional

Defiant Disorder (ODD) and social cognitive impairments. Results indicate, however, that children with ADHD do not demonstrate such deficits consistently, and in those cases where deficits do exist, the connection to negative outcomes is not clear.

In an investigation of the social cognitive processing abilities of children with ADHD alone, Milch-Reich, Campbell, Pelham, Connelly, and Geva (1999) explored differences between boys diagnosed with ADHD and a comparison group in understanding of ongoing social events. Thirty-eight boys with ADHD and 42 without a diagnosis, between the ages of five and ten, participated in experimental sessions designed to assess prior social schemes, mental integration, free recall, and social reasoning. As expected, younger children were found to possess less elaborate pre-existing social schemes; however, contrary to expectations, children with ADHD did not differ from children without a diagnosis in accessibility or availability of social responses. Based on these findings, the authors assert that any subsequent differences in information processing cannot be attributed to a lack of prior knowledge. More group differences were evident in the analyses of data on ongoing representation. Both younger children and children with ADHD spent less time looking at the picture stimuli than either older or non-diagnosed children did. Further, although boys with ADHD did not differ from their non-diagnosed peers in the encoding and verbalization of crucial social cues, both the older and non-diagnosed groups demonstrated a greater depth of perception regarding the social impact of these events. Similarly, boys with ADHD generated fewer inferential connections between the presented pictures than did their non-diagnosed peers. Finally, when asked to explain why they thought the character acted in the way that he or she did, the young boys and those with ADHD were more

likely to offer less advanced reasons and to base their explanations on events toward the end of the story, omitting crucial earlier events. A hierarchical linear model of the data indicated that the integration index explained 21% of the variance beyond the 39% explained by age, clinical status, and accessibility of social schemes, with an additional 6% explained by duration of attention to stimuli pictures. Although any social performance difficulties associated with ADHD cannot be attributed to differences in prior knowledge or encoding of social cues, these findings indicate that the relative deficits in understanding social events demonstrated in this population are the result of more than simple inattention to environmental cues. Time spent attending to environmental cues, depth of perception concerning social impact, and the number of inferential connections among stimuli differentiated the ADHD and non-diagnosed groups.

Hoza, Waschbusch, Pelham, Molina, and Milich (2000) investigated the differences between boys with ADHD and a control group in their behavior, self-evaluations, and attributions following social successes and failures. Each of the 185 boys, ranging in age from seven to 12 years old, participated in two experimental conditions in which a same-aged confederate provided clearly positive or negative verbal and nonverbal feedback. A neutral test condition, designed to examine the impact of the experimental manipulation, and a positive interaction with a new confederate followed the initial success or failure manipulation condition. Controlling for age, IQ, and SES, analyses demonstrated significant multivariate effects of diagnosis for observational data, of diagnosis and Diagnosis x Time x Order interactions for self evaluations, and of diagnosis and Diagnosis x Time x Order for attributions. Follow-up analyses revealed

that boys with ADHD were rated as less socially effective than control boys, but also less frustrated or helpless than control boys. Boys with ADHD rated themselves significantly more positively than did control boys on four of the five items on the self-evaluation scale. ADHD and control boys also differed at Time 1 following failure for the items measuring their perceived effectiveness on the task and the degree to which they liked the confederate, with boys with ADHD rating themselves as more effective and liking the other boy more, than did control boys. Despite their lower ratings, by observers, of social effectiveness compared to non-diagnosed children, children with ADHD rated themselves more positively than did non-diagnosed children. When their first social interaction was the “failure” condition, this effect was even more substantial. Although the authors claim that most individuals demonstrate a tendency toward enhanced social perception, indicating the normality of positive illusions, this research indicates that children with ADHD have extremely inflated social perceptions.

In another investigation of social cognitive factors in children with ADHD, Hoza, Pelham, Dobbs, Sarno Owens, and Pillow (2002) investigated the differences between boys diagnosed with ADHD and a non-diagnosed control group on measures of self-perception. Two hundred eighty-six boys completed the *Self-Perception Profile for Children* (SPCC; Harter, 1985), and their teachers completed a teacher version of the scale. In order to operationally define over- and underestimation of ability, discrepancy scores between the self- and teacher reports were calculated. Significant group differences and moderate to large effect sizes were found for the scholastic competence, social acceptance, and behavioral conduct subscale discrepancy scores, with the ADHD group consistently overestimating their competence, compared to teacher report. Further,

investigation of differences within the ADHD group revealed that both aggressive and non-aggressive boys with ADHD tended to overestimate their abilities in all areas to a greater degree than the control group did. More specifically, those boys with ADHD *and* aggressive behavior overestimated their social ability and behavioral conduct to a significantly greater degree than did their non-aggressive counterparts with ADHD. These results extend Milch-Reich and colleagues' (1999) findings regarding the possible causes of social difficulty, from attention and interpretation to internal factors, such as self-perception.

Scholtens, Diamantopoulou, Tillman, and Rydell (2012) explored the relationship among ADHD symptoms, ODD symptoms, cognitive functioning, social acceptance and positive illusory biases in a population of 86 children between the ages of seven and 13, diagnosed with ADHD. Results indicated a positive correlation between ADHD and ODD symptoms, between ODD symptoms and working memory, between informant reports of social acceptance and disruptive behaviors, between child-reported social acceptance and inattention, and between the positive illusory bias and disruptive behaviors. More specifically, both inattention and hyperactivity were correlated with all the cognitive factors, including working memory and inhibition. Disruptive behavior and inattention contributed to informant reports of social acceptance, uniquely independent of hyperactivity, impulsivity, and ODD symptoms.

### **Social Difficulties Associated with Disruptive Behavior Disorders**

Similar to the investigations by Milch-Reich and colleagues' (1999) of the processing of social-emotional stimuli in children with ADHD, Egan, Brown, Goonan, Goonan, and Celano (1998) investigated boys' ability to decode emotional stimuli,

comparing this ability over time and the presence or absence of general externalizing disorders. Sixty-five boys, ranging in age from five to 14 years, including 28 boys receiving treatment for a disruptive behavior disorder, were administered a video-based emotional decoding task. The task required them to choose which of four emotions was presented in a video-based vignette. Contrary to the author's initial hypotheses, as well as Milch-Reich and colleagues' (1999) findings in children with ADHD, children with externalizing behavior problems were no less accurate than their normally developing peers in decoding emotions; ANOVAs investigating group membership as the independent variable were not significant. As expected, and corroborating Milch-Reich and colleagues' (1999) findings, however, a clear developmental trajectory of improvement in decoding accuracy was demonstrated; chronological age was predictive of accuracy of emotional perception. Given the broad inclusion criteria of the author, however, including children from kindergarten- to high school-age and a variety of diagnoses, a failure to discover significant group differences is not particularly surprising.

In order to explore the impact of positive self-illusions on the peer relationships of children with aggression only, Brendgen, Vitaro, Turgeon, Poulin, and Wanner (2004) examined the relationship over time between positive illusions of peer relationships and adjustment in a population of both aggressive and non-aggressive children. Eight hundred nineteen children in the fourth through sixth grades completed the six-item Self-Perceived Social Acceptance subscale of the *Self-Perception Profile for Children* (SPPC; Harter, 1985) and the *Friendship Quality Questionnaire* (FQQ; Parker & Asher, 1993) in order to assess their perception of their social acceptance and of the quality of their friendships with their best friends. Their classmates completed peer nomination

measures of social preference, friendship reciprocity measures, and a measure of peer aggression, combined from the *Pupil Evaluation Inventory* (PEI; Pekarik et al., 1976), the *Proactive and Reactive Aggression Scale* (Dodge & Coie, 1987), and the *Indirect Aggression Scale* (Bjorkqvist, Lagerspetz, & Osterman, 1992). In order to operationally define the degree of social perception inaccuracy, the authors calculated a standardized residual score by regressing children's self-rated social acceptance at Time 1 on their ratings of social preference by their peers at Time 1. In contrast to hypothesized negative effects of positive illusions in social interactions, Brendgen and colleagues discovered that positive illusions about peer relationships predicted an *increase* in peer-rated social preferences and stability of reciprocated friendships over time, regardless of level of aggression. Despite these general benefits of positive illusions, the combination of initial aggression and *extreme* levels of under- or overestimation was discovered to predict increases in aggressive behavior. These findings offer a possible causal relationship for the correlation between aggression and greater overestimation of abilities in children with ADHD as demonstrated by Hoza and colleagues (2000, 2002); however, the failure of the authors to consider diagnoses within the experimental groups leaves the accuracy of this interpretation unknown.

### **Social Difficulties Associated with ADHD and Comorbid Conditions**

In order to explore the interactions among multiple diagnoses on measures of symptom severity, aggression, anxiety, and social-emotional functioning, among other variables, Kuhne, Schachar, and Tannock (1997) compared the effects of comorbid ODD or Conduct Disorder (CD) within a group of children between the ages of five and 12 , diagnosed with ADHD and participating in a treatment study including pharmaceutical

and parent-training approaches. Significantly, 50.5% of the sample of participants with ADHD met criteria for a comorbid diagnosis of ODD. A smaller percentage (13.2%) met criteria for a comorbid diagnosis of CD. Statistically significant differences among diagnosis groups were discovered for ADHD symptom severity with the comorbid groups displaying higher levels of symptoms than the ADHD group, and for parent- and teacher-rated aggression with the comorbid CD group unsurprisingly demonstrating higher levels of aggression than the ADHD or ADHD/ODD group. Participants did not differ on measures of self-perception of competence. Regarding social skills, Kuhne and colleagues found significant results in a line-item analysis of parent and teacher ratings, with greater difficulties exhibited by the comorbid groups. Although the authors caution that the small number of participants in the ADHD/CD group may have caused an inability to distinguish this group from the ADHD/ODD group, an overall pattern of increased difficulty with comorbid diagnoses is evident, particularly in the social realm.

In order to elucidate these complex relationships among social cognitive deficits, social skills weaknesses, and poor social relationships in children with ADHD and its frequently comorbid conditions, Frankel and Feinberg (2002) compared the social abilities of children diagnosed with ADHD, ODD, comorbid ADHD and ODD (ADHD/ODD), and neither disorder. The parents of 95 6- to 12-year old children completed the *Social Skills Rating System* (SSRS; Gresham & Elliot, 1990), and their teachers completed the *Pupil Evaluation Inventory* (PEI; Pekarik, Prinz, Liebert, Weintraub, & Neale, 1976). Analyses revealed significant main effects for both ODD and ADHD diagnoses on the PEI Aggression scale, with diagnosed children receiving higher scores than non-diagnosed children. No other main effects or interactions on



either measure reached statistical significance for children with ADHD diagnoses, either alone or comorbidly with ODD. These results support earlier research indicating associations between ADHD and aggression, although without the expected increase in symptom severity with comorbid diagnosis, as seen in Hoza and colleagues' (2002) and Kuhne and colleagues' (1997) research regarding self-perceptions.

In an attempt to distinguish the encoding abilities of children with ADHD from the difficulties experienced by children diagnosed with its frequently comorbid conditions, Sprouse, Hall, Webster, and Bolen (1998) examined the ability of children with learning disabilities (LD), LD and comorbid ADHD (LD/ADHD), or no diagnosis to perceive nonverbal social cues. Additionally, the authors selected a more narrow age range than Egan and colleagues (1999), including only elementary-age children. A total of 57 children, ranging in age from six to ten years old, were administered the *Diagnostic Analysis of Nonverbal Accuracy* (DANVA; Nowicki & Duke, 1989) and their teachers completed the *Social Perception Behavior Rating Scale* (SPBRS; Maheady & Harper, 1986). Post hoc analyses of significant multivariate results revealed that on the facial expressions subtest of the DANVA, the LD group received significantly lower scores than either the LD/ADHD or no diagnosis groups. Interestingly, on the SPBRS, the LD/ADHD group received significantly higher ratings than either the LD only or no diagnosis group, indicating *greater* abilities in this area than the other groups. There were no statistically significant differences between the ADHD/LD and no diagnosis groups on the DANVA or between the LD and no diagnosis groups on the SPBRS. Unlike earlier studies, which revealed significant differences between children with ADHD and a non-diagnosed group on measures of social cognitive processing, Sprouse

and colleagues provide evidence that diagnosis of ADHD itself does not dictate significant difficulties in interpretation of social cues. Rather, their results point to the presence of learning disabilities as a stronger correlate to deficits in the cognitive processing of social cues.

Relatedly, Hall, Peterson, Webster, Bolen, and Brown (1999) investigated the differences between elementary school-aged children with ADHD, ADHD and comorbid LD (ADHD/LD), or no diagnosis in perceiving nonverbal social cues. Forty-five seven to 10-year olds were administered the DANVA and their teachers completed the SPBRS, as in the previous study. Although a significant group difference was revealed for teacher ratings on the SPBRS, post hoc analysis revealed that this finding was due to the difference between the ADHD/LD group and the control group; no significant differences between the ADHD only and control groups or ADHD only and ADHD/LD groups were found. Results of analyses of the DANVA data indicated a significant effect for Paralanguage Gestures, indicating that children in the ADHD/LD group demonstrated less ability to interpret tone of voice than did children in the ADHD only and control groups. No effects were found for the Facial Expression, Postures, or Gestures subtests, or between the ADHD only and control groups. Similar to the Sprouse and colleagues (1998) study examining differences between children with LD and LD/ADHD, this study indicates that ADHD alone does not predict specific deficits in social cognitive abilities.

Also similar to Sprouse and colleagues' (1998) and Hall and colleagues' (1999) attempts to distinguish the deficits associated with ADHD from those associated with its frequently comorbid conditions, Coy, Speltz, DeKlyen, and Jones (2001) investigated the effectiveness of preschool boys in social problem solving. They examined the

relationship between problem behaviors, defined by diagnosis of ODD or comorbid ODD/ADHD, and the social-cognitive processes involved in encoding and generating responses to hypothetical social dilemmas over time. The 88 boys with diagnoses were twice as likely as the non-disruptive comparison group to generate aggressive solutions to problems, supporting the earlier findings of Dumas (1998). Moreover, the absence of aggressive or hostile attributions or solutions at Time 2 were predictive of diagnosis status at Time 3; diagnosed boys at Time 2 who did not generate hostile attributions were significantly more likely to be free of diagnosis or to have ODD alone at Time 3 than diagnosed boys who generated hostile attributions. Further, the diagnosed group encoded the social information presented in the scenarios less accurately. The ODD and non-disruptive groups did not differ on the basis of attributions or response evaluations, and comorbid diagnosis of ADHD did not differentiate among boys with ODD. This investigation highlights two significant findings in the cognitive differences between disruptive and non-disruptive children. First, without intervention, the nature of preschool-aged children's attributions is remarkably stable over a two-year period. This stands in contrast to Egan and colleagues' (1998) and Milch-Reich and colleagues' (1999) findings of a maturity effect, with older children exhibiting more complex social processing. Second, and perhaps most importantly, the most negative findings regarding social cognitive processes appear to be related to the behaviors associated with ODD rather than ADHD.

Melnick and Hinshaw (1996) investigated the predictive ability of the social goals of boys with ADHD during a competitive interaction with peers with regard to their social standing among a larger peer group. Twenty-seven boys diagnosed with ADHD

and 18 comparison boys, ranging in age from six to 12 years old, participated in individual interviews regarding their goals for a peer interaction, attended a naturalistic summer camp, and were administered sociometric nomination measures regarding their peers. Although no differences on the basis of diagnosis alone were found for initial social goals, boys with ADHD and high levels of aggression endorsed goals of getting in trouble and having fun significantly more than either boys with ADHD and low aggression or comparison boys. Further, boys with ADHD and high aggression endorsed the goal of “being fair” to a significantly less degree than boys with ADHD and low aggression. Raters, observing the participants during the competitive task, indicated that boys with ADHD and high aggression played fair to a lesser degree than either of the other two groups and showed off more than did the comparison boys. At the end of the summer program, the data revealed main effects of subgroup for social preference, with high-aggressive/ADHD boys the least liked and comparison boys the most liked. Similar to the research of Hoza and colleagues (2002), high levels of aggression exacerbate the social difficulties of children with ADHD.

In order to determine any relationships between social goals and later social preference, Melnick and Hinshaw (1996) conducted multiple regressions, revealing a number of statistically significant predictors for the outcome variables. Stronger endorsements of “not afraid of getting in trouble,” were strongly related to lower levels of social acceptance at the end of the summer program. In contrast, endorsement of “wanting to cooperate” was correlated with higher social acceptance. These self-reported goals explained a significant portion of the variance of peer acceptance, even after controlling for aggression during the interaction. No significant relationships were found

between overall observer-rated goals in social interaction and social preference.

Observer-rated goals predicted social preference differentially for the boys with ADHD and the comparison boys. Being rated as wanting to protect self-esteem during the game predicted higher social status at the end of the summer program for boys with ADHD and lower status at the end of the summer program for comparison children. Higher scores on the goal of “want to make the game fun” predicted higher social preference scores in the summer program for boys with ADHD. In contrast, the more comparison children were judged to want to make the game fun, the *lower* their social preference scores. Similar differential prediction was found for ratings of the goal of wanting to dominate.

In another investigation considering the effects of ADHD and aggression, Melnick and Hinshaw (2000) investigated the ability of emotional regulation strategies following a frustration experience to predict behavior and social preference in peer interactions. Forty-five boys diagnosed with ADHD and 37 comparison boys, between the ages of six and 12, participated in a task designed to elicit frustration with their families and, later, at a naturalistic summer camp. Trained observers, blind to the boys’ diagnoses, collected objective data during the family task and throughout the summer camp; peer-nominated sociometric interviews were conducted at the end of the summer program. During the initial manipulation task, boys who were diagnosed with ADHD and demonstrated high levels of aggression were rated as displaying more negative responding, accommodating, and intense venting than either low-aggressive boys with ADHD or the comparison boys; further, they were also rated as demonstrating lower overall emotional regulation. During the summer program, high-aggressive boys with ADHD differed from the low-aggressive and comparison boys on three measures. They

were more aggressive than both groups, less compliant than both groups, and rated by their peers as less socially preferred than both groups. Interestingly, the low-aggressive boys with ADHD were only less compliant than the comparison boys were and did not differ in aggression or social preference. Multiple regressions revealed a number of statistically significant predictors for the outcome variables with the overall model accounting for as much as 35% of the variance. Individual emotional regulation strategies and negative responses to the frustration task predicted noncompliance; negative responses to the frustration task and accommodation predicted social preference. The presence or absence of ADHD diagnosis did not moderate the relationship between the predictor and outcome variables; levels of aggression differentiated boys from the control group to a greater degree than did diagnosis of ADHD.

### **Impairments in Social Acceptance and Friendship across Diagnoses**

Despite the divergent findings of researchers investigating the performance on social cognition tasks of children with ADHD specifically, research clearly indicates that that children with ADHD, or related difficulties including hyperactivity, impulsivity, and aggression, do demonstrate significant difficulty with peer relationships. These children have been shown to be less accepted by their peers, score lower on measures of social preference, and have fewer reciprocated friendships. Given the negative effects that social rejection can lead to in emotional, behavioral, and academic functioning (Bagwell, et al., 2001), the need for early, effective intervention in this area is warranted, even if the etiology of these difficulties is not completely agreed upon in the literature.

In one of the few studies investigating girls diagnosed with ADHD, Blachman and Hinshaw (2002) examined differences in friendship, friendship stability, and

friendship quality between 140 girls with ADHD and 88 comparison girls. These girls, between the ages of six and 12, who were attending a naturalistic summer camp, were administered sociometric nomination interviews on three occasions in order to gather data regarding peer acceptance, friendship reciprocity, and friendship stability. Finally, all participants completed the *Friendship Qualities Measures* (FQM; Grotmeter & Crick, 1996); results from this measure were analyzed for those girls who had reciprocated friendships in the previous procedure. Post hoc analyses of significant main effect for diagnosis revealed that girls with either ADHD-Inattentive type or ADHD-Combined type had significantly fewer friends than the comparison girls. Further, main effects for diagnosis were found regarding friendship stability, with girls diagnosed with ADHD-Combined type having fewer stable friendships than comparison girls between weeks one and three and girls diagnosed with ADHD-Inattentive type having fewer stable friendships between weeks three and five. No group differences in friendship stability between weeks one and five reached statistical significance. Overall, these results indicate that girls with ADHD-Combined type have initial trouble establishing a friendship. In contrast, girls with ADHD-Inattentive type have difficulty maintaining friendships over time. Finally, the friendships of both inattentive and combined type girls contained higher levels of negative relationship features than the friendships of comparison girls. Follow-up analyses revealed that these differences were likely attributable to higher levels of conflict, relational aggression within the friendship, and relational aggression to others. Interestingly, the results of this study indicate that ADHD can be associated with not only overt aggression, as demonstrated in earlier research

(e.g., Frankel & Feinberg, 2002), but also other forms of aggression, such as relational aggression.

Bagwell and Coie (2004) investigated the best friendships of aggressive and non-aggressive boys, via self-report measures of friendship quality and behavioral observations of interactions. Twenty-four aggressive and 24 non-aggressive boys and their best friends, with an average age of 10 years, completed the *Friendship Qualities Scale* (FQS; Bukowski, Hoza, & Boiin, 1994), were administered a semi-structured interview, and participated in manipulated conflict and temptation situations. Although no group differences were found for any of the friendship dimensions on the self-report FQS, non-aggressive boys and their best friends were rated by blind observers as having higher quality friendships than aggressive boys and their friends. Further, aggressive boys and their friends were rated as engaging in more antisocial behavior than non-aggressive boys and their friends. Analyses of behavior during the experimental manipulations revealed that aggressive boys and their friends encouraged each other to engage in more antisocial behavior and did engage in more rule violations in both the conflict and temptation situations, while non-aggressive boys and their friends exhibited greater positive engagement, reciprocity, and on-task behavior. Similarly, supporting the authors' hypotheses, the dyads including aggressive boys were rated as displaying significantly more intense and negative emotionality during conflict. Given the strong connection between ADHD and aggression demonstrated by Frankel and Feinberg (2002), these results must be considered a potential outcome if early challenging behaviors are not addressed.



Gresham, MacMillan, Bocian, Ward, and Forness (1998) investigated differences between groups of children exhibiting hyperactive/impulsive/inattentive and conduct problems (HIA + CP), children exhibiting internalizing and externalizing behaviors (I + E), and matched controls on peer-rated measures of rejection and friendship and teacher ratings of social skills. Data on peer rejection and friendship was collected utilizing peer ratings and nomination procedures; teachers' perceptions were operationally defined by scores on the Total Social Skills scale of the *Social Skills Rating System* (SSRS; Gresham & Elliot, 1990). Analyses revealed that the HIA + CP group had lower peer acceptance scores than either the I + E or control groups, had lower social preference scores than both groups, had fewer reciprocated friends than either group, were rejected more often by their peers than either group, and were rated as demonstrating fewer social skills by their teachers than either group. Although this research does not provide evidence for a causal relationship, it does provide a clear correlation between teacher ratings of social skills and peer acceptance.

### **Social Competence Interventions for Children with Emotional-Behavioral Disorders**

Clear substantiation for the connections among ADHD, aggression, negative peer relationships, and peer rejection exists. Although the need for early, effective intervention is evident, research in this area describes the difficulty in designing effective intervention. Further, intervention studies including preschoolers are limited.

Mathur and colleagues (1998) reviewed 64 single-subject studies that sought to implement social skill training for students with emotional or behavioral problems, and demonstrated only minimal treatment effectiveness. The mean percentage of non-overlapping data points was 62% with a large standard deviation of 33%. No relationship

between length of social skill instruction and treatment efficacy was found. Although they discovered weaker effects for social skills training with preschool students, two explanations exist for this unexpected finding. First, as noted by the authors, many interventions may not be adapted to developmentally appropriate levels for these youngest students. Second, and not noted by the authors, is the possible relationship between category of emotional/behavior problems and age. The Mathur et al. (1998) study investigated a population of children with a greater variety of emotional or behavioral problems, finding that children with autism were significantly less likely to benefit from social skill instruction than children with emotional-behavioral disorders or children identified as delinquent. It appears to be more likely that preschool students would be diagnosed with autism, rather than emotional-behavioral disorders or involved in the juvenile justice system. The authors do not note any significant overlap between age and category of disorder. The present study does provide further evidence that social skills training is an ineffective intervention selection for children with emotional or behavioral disorders, but does not offer compelling evidence that preschoolers cannot benefit from interventions designed to increase their social competence.

Corroborating the findings of Mathur and colleagues (1998), Quinn and colleagues (1999) reviewed 35 group-design studies investigating the effects of social skill training for students with emotional-behavioral disorders, discovering only a small pooled effect size of .0199. In fact, 27% of the effect size measurements were negative, indicating that more than a quarter of studies found greater improvements in the non-intervention group. Further, corroborating the results of Mathur and colleagues (1998),

they discovered no differences in effect size based on intervention type, duration of intervention, research quality, age of participants, and rater of the independent variable.

Gresham, Sugai, and Horner (2001), however, offer a variety of explanations for the findings in Mathur and colleagues' (1998) and Quinn and colleagues' (1999) meta-analyses. Although Gresham et al. acknowledge the difficulty thus far in developing interventions that result in improvements in social skills that are consistent, maintained, and generalized, they critique the design of the meta-analyses as including populations of children with too diverse characteristics and classifications. Further, the interventions reviewed may have been of insufficient length, and not early enough in the participants' development; the mean age of studies reviewed was 12 years. With regard to the content of the interventions themselves, Gresham asserts that most studies of social skills training devote insufficient attention to the differences among acquisition, performance, and fluency deficits, and do not attend to treatment integrity issues. Further, interventions must attend more to the antecedents and consequences of social behavior, in the natural setting in which such behaviors occur. A final explanation offered by Gresham et al. for the failure of these meta-analyses to demonstrate significant improvements is the variety of potentially unreliable and invalid measures utilized to measure change. It is hypothesized that earlier intervention, for an extended period of time, utilizing individualized assessment, delivered in a child's typical environments would result in improved outcomes on socially valid measures.

Webster-Stratton and Reid (2003) describe a model of intervention to improve the social skills of children diagnosed with either ODD or Conduct Disorder, comparing outcomes of child training, parent training, or child and parent training, and a wait list

control. The authors assert program success; however, with scant information about the psychometric properties of the dependent measures or the methods of data analysis, detailed analysis of their appropriateness and application is impossible. Although group differences in effect size are reviewed, the specific statistics utilized to compare differential effects are absent. Rates for one observational measure are noted, reporting rates of physical aggression by children in the treatment groups decreasing from 24 acts per day to 12 acts per day. Certainly, one is led to question the clinical significance of this change; 12 incidents of aggression over the course of a single day is not likely within the range of social appropriateness or acceptance.

### **Interventions for Social Competence in Children with ADHD**

Jensen and colleagues (2001) investigated the effects of comorbid diagnosis (parent-reported anxiety, ODD/CD) on treatment response in a group of children between the ages of seven and nine with ADHD. Interventions included medication management, behavioral intervention, and a combined approach, with data collected at baseline and 14-months. Comorbidity with ODD/CD demonstrated significant effects on baseline characteristics, but not on treatment response or post-intervention functioning. In contrast, internalizing conditions demonstrated less significant effects on baseline characteristics, but more significant effects on response to treatment types. Specifically, students with ADHD and anxiety responded rather well to behavioral intervention, but also better to any of the interventions than the other comorbidity groups. Students with ADHD-only and ADHD + CD/ODD appeared to respond only to interventions with a pharmaceutical component. Following intervention, however, these two groups demonstrated significant symptomology related to aggression and social skills. The

authors assert that these distinct patterns in initial characteristics and treatment response indicate the need for careful consideration of comorbid diagnoses when developing a treatment plan for a child with ADHD.

Molina and colleagues (2009) investigated the long-term effects of participation in a behavioral intervention, medication monitoring, a combined approach, or community control group on children diagnosed with ADHD. At the time of intervention, participants ranged in age from seven to nine years old; the data analyzed in the current study therefore resulted in mean ages of 14 and 16 years at six and eight years post-intervention, respectively. Unfortunately, participants with ADHD demonstrated significant impairments in adolescence, and no significant intervention group differences were found on any dependent variable. Treatment response between 14-months and 36-months post-baseline, however, regardless of treatment group, were found to be a powerful predictor of long-term outcomes. Initial ADHD symptom severity and conduct problems, significantly more than intervention group, predicted long-term functioning into adolescence. The authors conclude that expectations for intervention may be better framed in terms of improvement relative to baseline levels, rather than not normalization compared to the general population.

More specially intervening with social skills, Antshel and Remer (2003) investigated the efficacy of social skills training model, compared to a no-intervention control group. The social skills training was implemented over an eight-week period with 120 children, ranging in age from eight to 12, with diagnoses of ADHD-Inattentive type or Combined type. The curriculum utilized was a modified version of that described by Milich and colleagues (1995), abbreviated to an eight-week format and specified for

the skills and deficits typically exhibited by children with ADHD. Analyses of outcome measures, including the *Social Skills Rating System* (SSRS; Gresham & Elliot, 1990), revealed no significant Group x Time interactions for the parent ratings. A simple effect for group was revealed, and was determined to be attributable to differences between the treatment and control groups at both post-treatment and follow-up, with the treatment group exhibiting significantly higher scores on the SSRS-Assertion scale. The same findings were demonstrated for the SSRS-Assertion scale on the child self-report form, with the treatment group exhibiting significantly higher scores than the control group at both post-treatment and follow-up. When diagnosis of Oppositional Defiant Disorder was included in these analyses as a covariate, additional group effects for the Parent SSRS Cooperation and Responsibility scales and the Child SSRS Self-Control and Empathy, emerged at both post-treatment and follow-up. Further examination of data with attention to ADHD subtype revealed that the parents of children with ADHD-I reported larger improvements at post-treatment than parents of children with ADHD-C on the assertion scale. Again, these effects were paralleled by child self-report data. The results of this investigation clearly indicate that, similar to students with other emotional-behavioral disorders, social skills training is ineffective for children with ADHD, particularly those with comorbid ODD. Although the treatment group did demonstrate increases in ratings on the SSRS Assertion scale, this improvement in the absence of other positive effects is of dubious clinical significance. The authors suggest that this ineffectiveness is a result of the intervention's failure to address the impulsive behaviors associated with ADHD, thus supporting Barkley's behavioral inhibition model described

earlier. These results indicate the need for future investigations of interventions designed to improve social skills to simultaneously target decreasing impulsive behaviors.

Despite these documented failures of social skills training in improving the social competence of children with ADHD, a number of studies with minimal modifications to these traditional designs have resulted in greater improvements in parent and teacher ratings of behavior, as well as ratings by non-biased observers. Frankel, Myatt, Cantwell, and Feinberg (1996) investigated the effect of supplementing a 12-week training group with parent training to generalize skills relevant to their children's social adjustment. Sixty-four clinic-referred children between the ages of six and 12, including 47 children diagnosed with ADHD and prescribed stimulant medication, were randomized to either treatment or wait-list control groups. The children assigned to the experimental group participated in weekly groups focusing on those social skills typical of children rejected by their peers, and utilizing homework, didactic presentations, behavioral rehearsal, coaching, coached play, and contracting with parents as instructional strategies. Their parents concurrently participated in parent sessions, addressing support of social skills, effective praise, successful play with peers, and strategies to decrease physical fighting. The analysis of the parent-reported Assertion and Self-Control subscales revealed significant main effects of treatment, with the treatment group obtaining significantly greater improvement than the waitlist group. Unexpectedly, the treatment group was also found to have significantly higher ratings on the Aggression subscale than the waitlist control. Treatment and waitlist groups with ADHD did not differ significantly, and the main effects and interactions with presence or absence of ODD were not significant. Although this investigation resulted in more promising findings than those previously

reviewed, a major confound in this study is the fact that all participants were prescribed stimulant medication. Therefore, the ability of these findings to be generalized to a non-medicated population is limited.

Pfiffner and McBurnett (1997) also investigated the effect of a brief social skills training intervention with a parent-mediated generalization program, compared to social skills training alone, or a wait-list control group. Twenty-seven children, diagnosed with ADHD and ranging in age from eight to ten, were randomly assigned to one of the three groups, with the two treatment groups attending eight weeks of social skills training. Instructional methods included brief didactic instruction, symbolic and in vivo modeling, role-play, and behavioral rehearsal, focusing on good sportsmanship, accepting consequences, assertiveness, ignoring provocation, problems solving, and feelings recognition. In addition to the children's group, one treatment group included a concurrent parent session to facilitate generalization skills. Topics in the parent sessions included the importance of social skills, overviews of the children's lessons, observation of the children's group, and prompting and rewarding good behavior. Further, parents met with the children's teachers and requested that the teacher implement a daily report card, providing feedback on "getting along with peers." Analysis of ratings by parents revealed that, when the two treatment groups were considered together, their social skills were rated significantly higher than the control group. Despite the increased efficacy of treatment over no treatment, the parent-mediated generalization program did not result in any additional benefits to the participants; the difference between parent ratings of social skills was not significant. Similarly, although the treatment groups demonstrated significantly greater improvements in parent ratings of problem behavior than the control



group, no differences were demonstrated between the two treatment groups. Teacher ratings of both social skills and problem behaviors did not reveal any group differences between the treatment and no treatment groups, or between the two treatment groups. The failure of even limited treatment effects to generalize to the school environment indicates the need for future investigations of interventions to improve social skills to program specifically for generalization to multiple environments.

In such an effort, Pfiffner, Kaiser, Burner, Zalecki, Rooney, Setty, and McBurnett (2011) explored the adaptation of a research-supported clinical intervention to school-based implementation in an elementary-aged population, with students ranging in age from seven to 11. The *Child Life and Attention Skills Program* includes teacher consultation, parent groups, direct intervention with children, and individual family-based consultation, focused on behavior modification and skill development. The 10 parent sessions included topics ranging from establishing routines, improving organization, stress management, and the effective use of redirection and rewards. The 10 child groups included topics such as following directions in a game, taking turns, accepting consequences, problem-solving, and friendship-making skills. Although the primary aims of this study were the process of intervention adaptation and feasibility, post-intervention results revealed decreases in ADHD symptoms and behavioral problems, and increases in organization and social skills; however, due to the lack of a control group, maturational and expectancy effects could not be eliminated as alternate explanations for these improvements.

Sonuga-Barke, Daley, Thompson, Laver-Bradbury, and Weeks (2001) investigated the efficacy of two 8-week, parent-based interventions on the symptom

severity of preschool-aged children with ADHD. Seventy-eight three-year-old children were assigned to one of three groups: parent training, parent counseling and support, or a waiting list control. The parent-training group received education on behavioral approaches such as increasing attention and decreasing difficulty behaviors, as well as weekly progress monitoring. The parent counseling and support group was an unstructured forum to discuss issues related to children's behavior. Both interventions were conducted on an individual basis, in the homes of participants. Significant treatment effects were found for ADHD symptom severity, with the parent training group resulting in significant reductions compared to both of the other groups, as measured by both interview and direct observation measures. No differences were discovered between the parent counseling and support group and the waiting list control group. Further a 15-week follow-up revealed continued treatment effects. It is important to note, however, that although significant group effects were discovered, only 50% of participants demonstrated clinically significant levels of improvement.

In an exploration of the efficacy of the Incredible Years program, demonstrated effective in children with ODD, Webster-Stratton, Reid, and Beauchaine (2011) implemented a parent-training and direct intervention in a population of 99 four to six year olds with ADHD. Although they note that approximately half of their participants also met criteria for ODD, comorbid diagnosis was not considered in their data analysis. Following 20 weekly two-hour parent sessions and concurrent child groups, significant Condition x Time interactions were revealed on the externalizing subscales of the *Child Behavior Checklist* (Achenbach, 1991) and the *Eyberg Child Behavior Inventory* (Robinson, Eyberg, & Ross, 1980), as well as on measures of social competence, as

reported by participants' mothers. Further, significant differences between the intervention group's and control group's social competence, aggression, hyperactivity, intensity of problem behaviors, and number of problem behaviors, as rated by their mothers. Interestingly, and perhaps lending support to concerns about expectancy effects and rater bias, fathers' ratings demonstrated lower levels of Condition x Time significance on fewer measures; no group differences were evident post-treatment. For teachers, only the CBCL Externalizing Composite scores revealed a Condition x Time interaction. Again, no group differences were evident post-treatment, and observations in the school setting did not reveal significant changes in externalizing, inattentive, or hyperactive behaviors. The authors note that the failure to measure change on teacher rating scales is not surprising, as intervention in the school setting was not implemented. Future research would need to include a school-based component for generalization.

Sheridan, Dee, Morgan, McCormick, and Walker (1996) implemented a brief, 10-week social skills training for five boys with ADHD in conjunction with a parent group to facilitate skill development. The children's group included topics such as social entry, maintaining interaction, and solving problems, and utilized instructional methods including modeling, behavioral rehearsal, and homework/contracts. The parent sessions aimed to teach parents the skills of debriefing, guided problem solving, joint goal setting, and skill transferring, and utilized instructional methodologies of reading assignments, video modeling, and in vivo performance feedback. Single-subject data analysis revealed increases in target behaviors during analogue role-play, with mean increases of 55% in social entry skills, 46% in maintaining interaction skills, and 31% in problem solving skills. Naturalistic observations revealed no evidence of skills during the experimental

phases; stability of data points was not achieved and a high percentage of overlapping data points was observed. Analysis of rating scale data revealed that two of the five subjects were rated as demonstrating increases of at least one standard deviation on the parent, teacher, and self-report forms of the *Social Skills Rating System*. A third subject demonstrated increases of at least one standard deviation on the parent and self-report forms, while the remaining two subjects demonstrated changes on the self-report form only. Further, all parents reported improvements in their child's behavior, as measured by the *Conners' Rating Scale*, of at least one standard deviation on at least one factor of the scale. Four of the five parents indicated improvements (decreases) of one standard deviation or more on the Impulsive-Hyperactive, Anxiety, and Hyperactivity Indices. The authors indicate that these findings can be attributed to perceived changes in behaviors addressed by intervention. Although these results support a promising intervention model, strengthening of its components are necessary in order for the skills taught to generalize to natural environments. Further, it is unknown whether the improvements in this study, as rated by parents, were displayed in other settings, such as school.

In another promising investigation, Colton and Sheridan (1998) examined the efficacy of behavioral consultation and social skills training to improve the play behaviors of three boys with ADHD, ranging in age from eight to nine years old. The boys participated in a behaviorally oriented social skills training, and a doctoral student in school psychology implemented a conjoint behavioral consultation intervention with their mothers and teachers. The consultation model incorporated the *Problem Identification Interview* (PII), *Problem Analysis Interview* (PAI), intervention implementation, and

*Treatment Evaluation Interview* (TEI; Bergen & Kratochwill, 1990). Utilizing a single subject research design, the authors assessed change over time via multiple probes across participants. The mean positive interactions during direct observations ranged from 24% to 31% during baseline and from 50% to 69% during treatment. Treatment effects were immediately evident following intervention implementation for all subjects; however, the percentage of overlapping data points ranged from zero to 50% across subjects. All parent and teacher ratings on the SSRS indicated positive increases in overall social skills scores from pretreatment to post treatment.

Although these studies provide preliminary support for the hypothesis that increased parent involvement appears to result in more powerful behavioral change, concerns regarding the clinical significance of each intervention exist. Although Frankel and colleagues (1997) were able to demonstrate an increase not only in assertion, but also in self-control, all of their participants had been prescribed stimulant medication. It is unclear whether the effectiveness of this intervention would generalize if implemented without medication in a similar population. Pfiffner and McBurnett (1997) similarly saw promising treatment effects, given an intervention model incorporating parent education and collaboration with teachers; however, no degree of improvement generalized to the school environment. Clearly, if multi-setting behavioral change is desired, the strength of school-targeted intervention must increase. Finally, although Sheridan and colleagues (1996) and Colton and Sheridan (1998) demonstrated positive change via a consultative approach, their sample sizes were rather small and evidence of generalization to school settings is limited.

Further investigating behavioral consultation as a means of delivering intervention for children with ADHD, Kern and colleagues (2007) compared the efficacy of a multi-setting consultation model incorporating functional behavior assessment with a parent education model, on the academic, behavioral, and social skills of preschool-age children at risk for ADHD. Following screening to include children with significant levels of those behaviors associated with ADHD, and to exclude children with indicated risk of autism or low cognitive ability, children received intervention for a one-year period. Children in the multi-setting group had the opportunity to receive functional assessment of their behaviors in both the home and school settings, individualized positive behavior plans for both settings, bi-monthly parent education, and monthly consultation in both settings, as well as activities designed to increase early literacy and numeracy skills. The parents of children in the parent education group received monthly sessions. Hierarchical linear models of outcome data revealed that both groups exhibited equivalent performance on all measures at baseline. Both groups exhibited statistically significant growth on measures of social skills in the home and school, of early literacy skills, of ratings of aggressive behavior in the home and school, of behaviors associated with ADHD in the home and school, of oppositional behavior in the home and school, of conduct problems in the home and school, and of delinquent behavior in the home. The authors offer a variety of possible explanations for their unexpected findings, beyond the equal efficacy of the two interventions. First, as they utilized an “intent to treat” model, families were included in data collection who did not participate in all aspects of the intervention. The authors reported that only 51% of the multi-setting group participated in at least one parent education session, and received intervention plans in both settings.

Second, they proposed that perhaps one-year of data was insufficient to reveal group differences that may emerge as children continue to mature and encountered the increased academic and behavioral demands of kindergarten. Finally, they offered parents' explanations for dropping out of the study as their children's behaviors improved, as perhaps disproportionately affecting the multi-setting group, to avoid "labeling" of their children in school. In their conclusion, Kern and colleagues suggest the need for further research investigating the possibility of a multi-tiered model for behavioral intervention, with increased intensity of intervention for those children with increased severity of behavior.

DuPaul, Kern, Volpe, Caskie, Sokol, Arbolino, and colleagues (in press) explored the two-year outcomes of this investigation, finding statistically significant improvements for 27 of the 46 variables analyzed. As in their previous study, however, when treatment group was added to the growth model, no group differences were evident, lending further support to the efficacy of the parent education intervention. Also reported were data regarding patterns of attrition, noting that the participants who remained involved with the investigation tended to exhibit greater levels of ADHD symptoms, off-task behavior, negative physical behavior, and negative verbal behavior, in both home and school, thus lending support to the authors' previous hypothesis that parents may have discontinued participation in the study as their children's behavior involved.

Although the data analyzed by Kern and colleagues (2007) and DuPaul and colleagues (in press) did not reveal group differences in the parent- and teacher-rated social skills of at-risk preschool-age children following an extended period of

intervention, data collected in direct observations of these children in their typical preschool settings has yet to be analyzed.

### **Relationship between Informant Reports and Direct Observations**

Cosper and Erickson (1984) explored the relationship between teacher ratings and direct observations of problem behaviors in the classroom, as exhibited by sixty-three boys in the first grade. Teachers completed three measures, the *Quay-Peterson Behavior Problem Checklist*, the *Miller School Behavior Checklist*, and a scale designed for the study in which they were asked to estimate the frequency of the behaviors tracked during direct observations. As expected, inter-observer agreement on the observation code, the *O'Leary, Kaufman, Kass, and Drabman Disruptive Behavior Code* (1970), ranged from .81 to .90. A factor analysis of the twenty-eight behaviors and subscales resulted in loading on six factors, which explained 77% of the total variance in the data. Perhaps the most intriguing finding of this investigation is that the three factors with the highest loadings separated the variables into the types of measure and rater. The first factor consisted of ratings on the standardized teacher rating scales, and accounted for 45% of the total variance. The second factor consisted of teacher ratings estimating levels of classroom behavior during the observation, accounting for 11% of the total variance. The third factor consisted of observation variables, and accounted for 7% of the total variance. Based on this clear delineation of factors, the authors concluded that none of the observation data was strongly related to the teachers' ratings; therefore, these assessment tools were measuring different aspects of children's behavior. They attribute these discrepancies to teachers basing their ratings on an average of children's behavior over an extended period of time, whereas neutral observers base their information on



simple occurrence or nonoccurrence of behavior at a specific point in time. This investigation provides a stark contrast between observation and rating scale data; however, the authors fail to provide information regarding the psychometric properties of the third estimation-based rating scale, the students' educational classifications, or psychiatric diagnoses.

Cost and Simpson (2004), in an attempt to explore the hypothesis offered by Gresham (1984) that the failure of many social skills training program to demonstrate more than weak treatment effects may be related to the investigators' choice of dependent measures, collected both rating scale and observational data on 48 children between the ages of six and twelve, with behavior disorders. Inter-observer agreement on the *Social Skills Direct Observation Scale* (SSDOS) averaged 90%; the correlations between subscales of the placement test for the ACCEPTS (*A Curriculum for Children's Effective Peer and Teacher Skills*; Walker, 1983) program ranged from .07 to .49. When the correlation coefficients between observed behaviors and rating scale skill areas were calculated, none reached statistical significance. The authors come to a somewhat different conclusion from similar data as the Cosper and Erickson (1984) investigation, asserting that their findings support the need for data from a variety of sources in child behavior assessment and program efficacy evaluation.

Similarly, Winsler and Wallace (2002) investigated the correlations between sources of social skills and behavior assessment data, including classroom observations, parent report, and teacher report in 47 typically developing preschool-aged children. Observations of children were conducted in their classrooms, with the following variables coded: observations of activity (goal-directed or not), social affliction (alone, with

peer/peers, with a combination of teachers and peers, or individually with a teacher), affect (positive, negative, or neutral), and appropriate or inappropriate behavior. Inappropriate behavior was defined as any “intentional action that did or was meant to physically harm another person, damaged property or classroom materials, or involved verbal or physical rudeness with another person” (p. 46). The absence of such occurrences was coded as appropriate behavior. Internal consistency was demonstrated for all sources of behavioral data. Parent and teacher ratings on the *Preschool Kindergarten Behavior Scale* (PKBS; Merrell, 1994) demonstrated low to moderate correlations, with a stronger relationship with regard to externalizing behaviors than internalizing behaviors. Further, the data provided by teachers revealed a stronger relationship with observations of behavior than did the data provided by parents. Teacher ratings of positive social skills was correlated with both sustained, goal-directed classroom activity and increased peer interaction ( $r = .39-.57$ ). Additionally, teacher ratings of externalizing behavior problems could be predicted by a subset of variables including parent ratings of externalizing behavior problems, observed inappropriate behavior, and observed goal-directed activity. Unlike other investigations, Winsler and Wallace reported generally stronger relationships between teacher rating scales and direct observations.

Kazdin, Esveldt-Dawson, and Loar (1983) collected data on the behaviors of 32 children between the ages of seven and 13, in a psychiatric inpatient facility. Most participants had current diagnoses of conduct disorder; however, other diagnoses including depression, ADHD, anxiety disorder, and adjustment disorder were present. Standardized rating scales, the *Conners Teacher Rating Scale* (CTRS; Conners, 1969)

and the *Child Behavior Checklist – Teacher Report Form* (CBCL; Achenbach, 1978), and estimates of classroom behavior were completed by their teachers and another adult in the classroom; direct observations of classroom behavior were also conducted. Although the authors expected the estimates of classroom behavior to exhibit a higher correlation with the direct observation data, as the same operational definitions were provided in both assessment methodologies, these correlation coefficients were not higher than those obtained on standardized rating scales. Further, this investigation yielded clear distinctions among informants regarding perceived severity of behaviors. Teachers' ratings of negative behavior were higher than those provided by the classroom rater; however, both of these sources indicated behaviors were less severe than indicated by direct observations. The authors conclude that each of these sources of information offers unique data in assessment processes, with direct observations provides more accurate information when collecting longitudinal data.

McEvoy and colleagues (2003) further explored the relationship between rating scale and direct observation data collected on the relational and physical aggression of 59 preschool-age children. In addition to teacher ratings, the *Preschool Social Behavior Scale, Teacher Form* (PSBS-T), the authors utilized a peer nomination form, the *Preschool Social Behavior Scale, Peer* (PSBS-P). During observations of participants at free play in their classrooms coded relational aggression, defined as “any verbal or nonverbal behavior that excluded others from play, or encouraged others to exclude a child, or threatened to exclude or ignore,” and physical aggression, defined as “kicking, hitting, pushing, shoving, grabbing or throwing toys, destroying others' materials or toys, or threatening to do any of these acts.” The strength of the relationship between ratings

and observations was dependent on the type of aggression considered. The correlation between ratings and observations of relational aggression was near zero; however, ratings and observations of physical aggression were more strongly related. These more visible behaviors seem to have resulted in more reliable measurement of problem behavior. As the participants were typically developing preschool-aged children, the data from all of these assessment tools were positively skewed; it is unclear, therefore, whether these findings would be replicated in at-risk populations of children, with higher levels of challenging behaviors.

Kenny and colleagues (2004) investigated the relationships between rating scales and direct observations of hyperactive behaviors as exhibited by students in the seventh grade. For each student, two teachers completed thirteen items from the Hyperactivity subscale of the *Behavior Assessment System for Children* (BASC), and observation data was collected via the *Functional Observation of Classrooms and Learners* (FOCAL), a computerized functional assessment program. Inter-observer agreement, calculated for 28% of the observation sessions, resulted in high to moderate inter-observer reliability ranged from 72.6% for occurrence of behavior to 98% overall. In contrast, comparison of teacher ratings on the rating scale items was calculated at 0.53. Calculating the correlation correlations between observed behaviors and rating skills resulted in the correlation of 0.389. Interestingly, for those students who engaged in low levels of hyperactive behavior during observation, the relationship between teacher ratings and classroom observations was strong; however, for those students with high to moderate levels of hyperactive behavior, the relationship between methodologies weakened. These findings naturally elicit questions regarding the selection of assessment tools in

intervention studies, in which participants are presumably engaging in higher than average levels of problem behaviors.

Although McCabe and Marshall (2006) investigated the relationship between rating scale and observational data on preschool-age children's social skills in a population of children with speech and language impairments, the social difficulties they delineate as common in this population are similar to those experienced by preschool children at-risk for developing significant behavioral difficulties. These include, but are not limited to, lower levels of pro-social behavior and poor attending behaviors. Observations of the participants during free play were conducted utilizing the *Social Interactive Coding System* (SICS; Rice, Sell, & Hadley, 1990) to measure verbal interactions. Their teachers and parents completed the *Social Competence Behavior Evaluation Scale* (La Freniere & Dumas, 1995), the *Teacher-Child Rating Scale* (Perkins & Hightower, 2002), and the *Parent-Child Rating Scale* (Primary Mental Health Project, 1999). The correlation coefficients between the SICS categories and the rating scale data revealed only low to moderate agreement, ranging from  $-0.357$  to  $0.369$ . Further, the observational code accurately differentiated the speech and language impaired group from the non-impaired group in 85.7% of cases. In contrast, the rating scales correctly differentiated between 0 and 81.6% of cases. The authors then investigated the utility of a model with data from multiple sources, as is best practice in behavior assessment, resulting in correct classification of 93.8% of cases; however, a model including only three behaviors on the SICS differentiated between children with speech and language impairment and those without 100% of the time. These findings of the accuracy of observational data in classifying groups of children with and without social skill

weaknesses speak to the utility of such data in monitoring growth and improvement over time.

In one of the few intervention studies explicitly investigating the strength of the relationship between informant reports and observational data, Nolan and Gadow (1994) collected data from numerous sources and settings in their investigation of the efficacy of a stimulant medication for 31 children, ranging in age from five to 13 years, who were referred for psychiatric evaluation and met criteria for diagnosis of ADHD. Observations of the participants were conducted in their classrooms during structured activities, as well as at recess and lunch times, utilizing a modified version of the *Classroom Observation Code* (Abikoff & Gittelman, 1985) and the *Code for Observing Social Activity* (COSA; Sprafkin, Grayson, Gadow, Nolan, & Paolicelli, 1986), to provide information regarding levels of both aggressive and pro-social interactions with peers. Following the observation, the participants' teachers were asked to complete the *Abbreviated Teacher Rating Scale* (ATRS; Conners, 1973) and the *Peer Conflict Scale* (PCS; Gadow, 1986), based on the child's behavior at the time of the observation. As expected, inter-rater reliability for the direct observations was high, ranging from 0.77 to 0.94 for behavioral categories. Moreover, approximately half of the correlation coefficients calculated between the rating scales and observational data were statistically significant. Differences between categories of behavior were discovered with a stronger relationship between ratings and observations for negative behaviors such as disturbing others, noncompliance, and nonphysical aggression, than for hyperactive behaviors. A further weakness in the relationship between ratings and observations was evident in analysis of data collected in unstructured settings; fewer correlations of behavior at recess and lunch

reached statistical significance. Although the authors conclude that teachers provide “reasonably good” data on the behavior of children with ADHD via rating scales, the value of this information with reference to specific categories of behavior and in certain settings is less clear.

## **Summary**

In conclusion, in light of the unexpected findings that outcomes did not differ between participants in a community control intervention consisting of monthly parent education sessions and participants in a multi-setting, individualized, function-based intervention, an exploration of other factors that could have mediated treatment response must be conducted. Specifically, previous investigations of the impact of the conditions and behaviors that can co-occur with ADHD indicate that factors such as a comorbid diagnosis of ODD and aggressive behavior explain group differences in social skills to a greater degree than the diagnosis of ADHD itself. Specifically, in a study of the social interactions of school-age children with ADHD, Matthys, Cuperus, and van Engleland (1999) discovered that children with a comorbid diagnosis of ODD endorsed a greater number of aggressive responses to social problems and indicated more confidence in enacting these responses, than those students with ADHD alone, an internalizing disorder, or no psychiatric conditions. Even in a preschool-aged population, children with both ADHD and ODD are more likely both to generate aggressive solutions to social problems and to attribute hostile intent to their peers (Coy, et al., 2001). In this investigation, Coy and colleagues did not discover any differences between preschoolers with ADHD and ODD and those with ODD alone, and note that no effects could be attributed to a diagnosis of ADHD. Similarly, in studies of children with ADHD who

also exhibit physical aggression, groups of children with ADHD and low aggression have not been found to differ from groups of children without a diagnosis (Melnick & Hinshaw, 2000). In contrast, children with both ADHD and aggression endorse social goals of getting in trouble and are least liked by their peers, compared to peers with ADHD alone or no diagnosis (Melnick & Hinshaw, 1996). Further, children with ADHD and aggressions are rated as playing less fair, as showing off more, as demonstrating more negative responding, more intense venting, and less emotional regulation (Melnick & Hinshaw, 2002). Most significantly, nonaggressive children with ADHD scored within the range of non-diagnosed boys on every category of emotional regulation measured (Melnick & Hinshaw, 2002). Thus, these difficulties beyond those typically demonstrated by children with ADHD may temper response to behavioral and social intervention.

Finally, given the age range represented in the investigations conducted thus far by Kern and colleagues (2007) and DuPaul and colleagues (in press), the relative age of participants may be a factor contributing to treatment response. Participants ranged in age at enrollment from 3 to almost 6 and in kindergarten. In an investigation of children ranging from age 5 to 16, older participants were found to have more significant impairments in parent-rated social skills than their younger counterparts (Booster et al., 2012). Given findings that children with ADHD already exhibit weaker social skills than their peers in kindergarten (Merrell & Wolfe, 1998), the window for social skill intervention falls within this age range. Indeed, in a longitudinal investigation, those children who were rated as hard to manage at age 3 were indistinguishable from their peers at age 6 if their behaviors improved (Campbell & Ewing, 1990). In contrast, those



children who continued to display clinically significant difficulty at age 6 were more likely to meet criteria for an externalizing disorder at ages 9 and 13 (Pierce et al., 1998). Coy and colleagues (2001) report that, in a population of preschoolers with ODD, both with and without ADHD, the presence of hostile attributions at Time 2 of their investigation was associated with continued diagnosis at Time 3; those preschoolers who did not generate hostile attributions were more likely to be free of diagnosis. Thus, the age range between 3 and 6 appears to be a crucial time for implementing behavioral and social intervention. Thus, children at the upper end of this age range at the beginning of intervention may demonstrate a weaker response to intervention.

The majority of research regarding social skill intervention has been conducted with a school age population, with kindergarten students at the low end of this age range. Such interventions have been demonstrated to result in improvements from baseline functioning, compared to control groups, but continued impairment, compared to typical peers (i.e., Murray et al., 2008). Despite the challenges in developing and implementing effective social skill intervention for school age children, low intensity interventions such as parent education have resulted in improvements in preschool children (Webster-Stratton et al., 2011; Kern et al., 2007; Sonuga-Barke et al., 2001).

Although Quinn et al. (1999) and Mathur et al. (1998) did not find significant effects for age in their meta-analyses, their investigations reviewed a rather wide range of ages. Comparing a narrower band for age effects, that is, the youngest children in the present investigation to the oldest children, who are approaching or in kindergarten, may provide essential information regarding the timing for effective intervention.

## Chapter 3

### Participants

The participants in the present study were 135 children (106 male, 29 female) from 85 daycares and preschools in the Lehigh Valley of Pennsylvania recruited for a larger study. This gender ratio (3.6:1) is a slight over-representation of males, given the 3:1 ratio in the population of individuals diagnosed with ADHD (APA, 2000). Participants ranged in age from 36 months to 70 months at the time of enrollment (*M* age at enrollment: 52 mos, *SD* =8.0). 63.7% of participants met criteria for ADHD Combined type at baseline, 10.4% for ADHD Inattentive type, 28.1% for ADHD Hyperactive-Impulsive type, and 74.81% for Oppositional Defiant Disorder (ODD). The racial classification of the participants was 72% white, 14% Hispanic, 2% African American, and 11% other. Treatment groups did not differ significantly for ADHD subtype, gender, presence of ODD, or age at enrollment.

Table 1: Demographics and diagnosis by group

Measure	MCI	PE
Age in months	50.8 (8.7)	54.5 (8.0)
Male	76.0%	80.6%
ODD diagnosis	76.6%	76.1%

Children considered to exhibit high rates of impulsive, hyperactive, or inattentive behaviors were recruited via advertisements in local newspapers and community television channels, as well as flyers, pamphlets, and informational presentations offered

to local pediatricians, daycares, and preschools. Permission was obtained to complete the screening process after a parent initiated contact and expressed interest in the program. Screening consisted of rating scales, a structured interview, and an individually administered measure of cognitive ability, in order to confirm the presence of high levels of the behaviors associated with ADHD and to exclude from participation those children who may have low cognitive ability, Conduct Disorder, or Autism.

### **Screening Measures**

**Conners' Ratings Scales, Parent and Teacher versions** (Conners, 1997). The Conners scales are checklists, completed by parents and teachers, of behaviors typically exhibited by children diagnosed with ADHD. Internal reliability coefficients range from .75 to .94, and test-retest reliability varies by subscale, ranging from .13 to .78 (Conners, 1998). The construct validity of the different versions of the CRS is high, as indicated by close adherence to DSM-IV diagnostic criteria for ADHD. Discriminatory validity is also high. The sensitivity of the measure, that it will correctly identify the presence of any diagnosis when any diagnosis exists, is calculated at .92; the specificity, that the instrument will correctly identify which diagnosis is present, is calculated at .95 (Conners, 1998).

**Checklist for Autism in Toddlers** (CHAT; Baron-Cohen & Gillberg, 1992). The CHAT is a brief parental interview regarding behaviors that are atypical of children diagnosed with autism. Sample items include questions such as, "Does your child pretend, for example, to make a cup of tea?" Negative answers to three items in both the parent and physician scales are associated with an 83% risk of Autism, as opposed to other Pervasive Developmental Disorders, indicating good discriminant validity. The

false positive rate is estimated at 17%; therefore, it is typically used only as screening indicating the need for further testing (Baron-Cohen & Gillberg, 1992).

**Gilliam Autism Rating Scale (GARS; Gilliam, 1995).** The GARS is a behavioral checklist, which provides an “Autism Quotient” score, as well as four sub-scores measuring the typical difficulties associated with the disorder, “Stereotyped Behaviors,” “Communication,” “Social Interaction,” and “Developmental Disturbances.” This measure is reported to have strong psychometric characteristics, with internal, test-retest, and inter-rater reliability coefficients in the .80s and .90s, and high discriminatory, construct, and criterion validity (Gilliam, 1995).

**Diagnostic Interview Schedule for Children (DISC; Shaffer, Fisher, Dulcan, et al., 1996).** The DISC is a structured interview administered to parents, and contains questions covering the criteria for diagnosis of ADHD, Oppositional-Defiant Disorder, and Conduct Disorder, among other common childhood diagnoses. The results are interpreted via computer programs, based on DSM-IV criteria. Test-retest reliability ranged from .43 to .71 (Hodges & Cools, 1990). Inter-rater reliability was high, ranging between .97 and .98 (Hodges & Cools, 1990). The sensitivity of the DISC interview is high at .95; however, the specificity is significantly lower, ranging from .25 to .80, varying with the severity of the disorder (Hodges & Cools, 1990). For the purposes of the present investigation, meeting criteria for ODD on the DISC at baseline will be utilized as an independent variable.

**Differential Ability Scale (DAS; Elliot, 1990).** The DAS is an individually administered cognitive battery, yielding overall cognitive ability and achievement scores. The Preschool Level, designed and normed for children between the ages of two years,

six months and six years, was utilized in the present study. Test-retest reliability scores for the general cognitive ability score and cluster scores were stable, ranging from .79 to .94. Evidence for strong concurrent validity was demonstrated in the high correlation between the DAS and the *Wechsler Preschool and Primary Scale of Intelligence – Revised* (Elliot, 1990). Further, the DAS has been described as having utilized a development process that resulted in a culturally fair and unbiased measure (Sandoval, 1992).

### **Measures of Dependent Variables**

**Social Skills Rating System** (SSRS; Gresham & Elliot, 1990). The SSRS is a standardized, norm-referenced checklist of child behaviors typically related to peer acceptance, relationships with adults, and academic performance. Items are positively phrased and rated for both frequency and importance. Separate, self-administered forms exist for parents and teachers at the developmental level represented in the present study. Due to the longitudinal nature of the larger study, the elementary forms of the SSRS were used. Many children would reach the upper age limit of the Preschool form prior to the completion of their data collection; therefore, the raw scores of each of these subscales were utilized in data analysis for the present study, as standard scores for the early data collection phases cannot be calculated, given that children were younger than SSRS age norms.

The Parent form generates scores for two scales, Social Skills and Problem Behaviors, with the Social Skills scale including four subscales: Cooperation, Assertion, Self-Control, and Responsibility. Internal consistency coefficients for the Social Skills subscales on the Parent form range from .65 to .87 (Gresham & Elliot, 1990). The test-

retest reliability of the Social Skills scale is .85, with subscale reliability coefficients ranging from .77 to .84 on the Parent form (Gresham & Elliot, 1990). The Problem Behavior Scale includes three subscales: Externalizing, Internalizing, and Hyperactivity. Internal consistency coefficients for these subscales range from .71 to .87 on the Parent form (Gresham & Elliot, 1990). The test-retest reliability of the Problem Behavior Scale is .84, with subscale reliability coefficients ranging from .48 to .72 on the Parent form (Gresham & Elliot, 1990). Test-retest reliability correlation for this scale is .93.

The Elementary Level Teacher form includes the two scales represented on the Parent form, as well as a third scale, Academic Competence. On the Teacher form, however, the Social Skills scale includes only three subscales, Cooperation, Assertion, and Self-Control. Internal consistency coefficients for these subscales on the Teacher form range from .86 to .94 (Gresham & Elliot, 1990). Subscale reliability coefficients on the Teacher form range from .75 to .88 (Gresham & Elliot, 1990). The Problem Behavior Scale for the Teacher form includes the same subscales as the Parent Form, Externalizing, Internalizing, and Hyperactivity. Internal consistency coefficients for these subscales range from .78 to .88 on the Teacher form (Gresham & Elliot, 1990). The test-retest reliability of the Problem Behavior Scale is .84, with subscale reliability coefficients ranging from .76 to .83 on the Teacher form (Gresham & Elliot, 1990).

**Behavioral observations.** The behavioral observation coding system utilized in the present study during free-play in school settings was based on the *Early Screening Project Social Observation Code* (Feil, Severson, & Walker, 1998; Feil, Walker, & Severson, 1995). The *Early Screening Project* (ESP) was adapted from the *Systematic Screening for Behavior Disorders* and is designed to screen large groups of preschool

children for both internalizing and externalizing behavior patterns, in order to provide early intervention services. The screening process consists of three assessment “gates”: teacher rankings, ratings, and direct observations of behavior (Walker, Sevenson, & Feil, n.d.). The ESP process as a whole has been demonstrated to have high concurrent validity with the *Preschool Behavior Questionnaire*, the *Conners Teacher Rating Scale*, and the *Child Behavior Checklist* (Feil, Walker, & Sevenson, 1995). Reliability coefficients of .80 for test-retest reliability and .77 for inter-rater reliability have also been demonstrated for the ESP process as a whole (Feil, Walker, & Sevenson, 1995). The behavioral observation codes for antisocial behaviors include negative verbal (NV), negative physical (NP), and disruptive behaviors (DB); the behavioral observation codes for pro-social behaviors include positive social engagement (PS) and parallel play (PP). For the purposes of the present investigation, the presence of negative physical behavior during baseline observation will also be utilized as an independent variable.

Table 2: Behavioral definitions for observational code

Code	Definition
Negative Verbal (NV)	Any verbal expression exhibited by the target student that is objectively threatening to a student, verbal teasing, or other negative statements
Negative Physical (NP)	Any negative physical contact with another student (e.g., hitting, kicking, biting, pulling hair, roughly grabbing clothes hard enough to pull another child off balance)
Disruptive Behavior (DB)	Behavior that is disruptive in the classroom that is not

	captured in NV or NP
Positive Social Engagement (PS)	Reciprocal interactions, either verbal or physical, that range from neutral to complimentary and/or openly affectionate
Parallel Play (PP)	Behaviors in which the target child is within three feet of another who is engaged in a similar activity, but there is no reciprocal communication. Both activities are similar, but the children are behaving independently

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Graduate students in school psychology, counseling psychology, or special education, blind to the purpose of the project and the group assignment of the children, served as data collectors, scoring rating scales as they were returned and completing direct observations. The data collectors were trained on the observational code until they reached 80% accuracy against a standard completed by an individual experienced in the use of the observational code, for each behavior. Thirty percent of the participants was randomly selected to be judged for inter-observer agreement; for these children, two data collectors observed in both the home and school. The average occurrence agreement was calculated to be 92%, across behaviors, with a range from 90-93%.

## **Procedures**

**Screening procedures.** First, the child's parents and primary teacher completed the appropriate versions of the *Conners' Ratings Scales* (Conners, 1997). If at least one subscale T-score on one of the ADHD scales on both versions of the CRS was 65 or above, parents were administered the *Checklist for Autism in Toddlers* (CHAT) (Baron-



Cohen & Gillberg, 1992). This measure includes items such as “Does your child enjoy playing hide and seek?” If a parent answered “yes” to two or more of the four questions, they were given the Gilliam Autism Rating Scale (GARS) (Gilliam, 1995). Children who received scores above 112 on the “Autism Quotient” of the GARS were excluded from participation in the study, and were referred to community resources for further assistance.

Those participants who were not considered to have a strong possibility of Autism were invited to participate in the structured interview, the *Diagnostic Interview Schedule for Children* (DISC) (Shaffer, Fisher, Dulcan, et al., 1996) in order to assess whether or not the child met DSM-IV (APA, 2000) criteria for Attention-Deficit Hyperactivity Disorder, Oppositional Defiant Disorder, or Conduct Disorder. Children who met criteria for diagnosis of Conduct disorder were eliminated from participation in the study, as a key element of the larger investigation was to prevent the development of more severe behavioral deficits. Diagnoses of Oppositional Defiant Disorder were not a criterion for inclusion or exclusion of participants, but were included in the interview for analysis in the larger investigation. 76% of the total population of the study met criteria for diagnosis of Oppositional Defiant Disorder.

Children who met criteria for ADHD, in the absence of Conduct Disorder or any indicators of a Pervasive Developmental Disorder, were then administered the *Differential Ability Scale* (DAS; Elliot, 1990), an individually administered test battery to measure their current cognitive and achievement levels. Children whose scores were below 80 were excluded from the study and referred to community resources for further assistance. Children whose scores were above 80 were randomly assigned, via a random

number table, to either the multi-setting intervention group (MCI) or the community intervention group (PE). There were no differences across treatment groups in measured cognitive ability. A total of 71 children were randomized to the MCI group and 64 children were randomized to the PE group. Following randomization, a meeting was scheduled with the child's parents to obtain informed consent for participation in the research study and review the details of the specific intervention they will be receiving. Each child was assigned to a consultant, an advanced graduate student in school psychology, counseling psychology, or special education, who would facilitate parent education sessions (PE), or facilitate parent education session and provide functional assessment and conjoint behavioral consultation in the home and school settings (MCI). Consultants only worked with one of the experimental groups over their time in the project, in order to limit confounds.

**Data collection procedure.** Data for the larger research project were collected at baseline, then at six-month intervals for two years, and finally, a follow-up at the end of the third year. For the purposes of the present study, data from the intervention phases were analyzed for a total of six possible data points (baseline, mid-first year, end of first year, mid-second year, end of the second year, and end of the third year).

Packets of rating scales were mailed to parents and teachers, with a self-addressed, stamped envelope for return and a cover letter instructing them to complete the enclosed forms based on the child's current behavior and adjustment. Also at these data collection points, parents and teachers were contacted in order to schedule direct observations of the child in their home and school settings. Data collectors requested that teachers select a time in which both structured and unstructured tasks could be observed

for twenty minutes. Parents were asked to schedule the home observation over the dinner hour, in an attempt to standardize observation contexts from family to family. Parents and teachers were compensated \$50 for their participation and completion of rating scales at each data collection point.

**Intervention setting.** Parent education sessions for both the MCI and PE groups occurred in easily accessible locations in the community, typically conference rooms in local hospital or school buildings. Childcare, refreshments, and transportation were available free of charge for the parents. If parents were unable to attend education sessions, attempts were made to schedule a meeting in the child's home for the consultant to present and review the materials with the parents. If this was not possible, materials were mailed to the home. In this way, all families in both groups received at least a minimum level of intervention.

Integrity of parent education sessions in both experimental groups was monitored by the principal investigators of the larger study. Consultants followed standardized outlines of topics and activities to be covered in the sessions. All parent education sessions were audio taped, and 80% of sessions were reviewed for integrity against the checklists. All parent education session met with 95-100% agreement with integrity checklists. Those that were less than 100% were due to one or more of the following factors: time ran out to finish the session, parents went off topic or discussed a topic longer than anticipated, or the audiovisual equipment broke so the consultant was unable to use the television or VCR. Parents in the PE group attended an average of 28.32% of sessions; parents in the MCI group attended an average of 34.97% of sessions.

For children randomized to the PE group, parent education sessions occurred once a month for a one-year period, with follow-up sessions every two months for an additional six months. The first parent sessions were an intervention overview and information regarding ADHD. A number of subsequent sessions were from the *Early Childhood Systematic Training for Effective Parenting* (STEP; Dinkmeyer, McKay, Dinkmeyer, Dinkmeyer, & McKay, 1997). Remaining sessions included general parenting and early childhood topics including safety, school readiness, language development, health, and cognitive development.

For children randomized to the MCI group, the 20 parent education sessions occurred once approximately every two weeks. The first sessions were the same as those delivered to parents involved in the PE intervention, a project overview and information regarding ADHD. Additional sessions included three sessions teaching parents to collect and analyze functional behavior assessment data, two sessions on pre-academics, a session on safety, and a session on the transition to school-age programs. The 11 remaining sessions were drawn from the *Community Parent Education Program* (COPE; Cunningham, Bremner, & Secord, 1998), which offers strategies to decrease challenging behaviors.

Initial assessments in the MCI group, consisting of a *Problem Identification Interview* (PII; Bergen & Kratochwill, 1990), direct observation by the consultant, focusing on the antecedents of and environmental responses to the child's behaviors, and data collection were conducted in both the home and school settings. Additionally, during the home assessment, a brief functional behavior analysis was conducted by a parent and the consultant in an attempt to provide evidence supporting the hypothesized

function of the child's behavior. Four 5-minute sessions were conducted (play, task, low attention, and removal of a preferred item) in random order. If challenging behaviors occurred, the reinforcement for that session (i.e., escape, attention, or access) was provided for a brief period of time. Those sessions in which higher levels of challenging behavior occurred were repeated for confirmation, with repetitions of the control (play) session in between. Following these assessments, all data were reviewed to determine the functions of the child's behavior. Individualized intervention plans were then developed for both the home and school settings, in consultation with the parents and teachers. These intervention plans were developed with a focus on not only decreasing the challenging behaviors identified by parents and teachers, but also on increasing positive, pro-social behaviors. Intervention plans were developed with an emphasis on positive behavior support principles and on preventative or instructive, rather than reactive, strategies. Examples of preventive interventions included transitional warnings prior to the end of preferred activities, increased attention prior to and preferred activities during times of decreased attention, and establishment and reminders of positively phrased rules. Examples of interventions to teach replacement behaviors included instruction in social skills such as sharing, instruction on how to ask for attention, and instruction on how to ask for a break in non-preferred activities. Examples of interventions implemented following target behavior included specific praise contingent on appropriate behavior, providing positive attention to nearby peer engaged in positive behavior, token economies, and access to preferred items contingent on positive behavior.

Following the joint development of an individual intervention plan, monthly consultation with parents and teachers occurred in the natural environment, i.e., the home

or school setting, over a one-year period. Appointments were scheduled at the parents' and teachers' convenience, with time allotted for direct observation of the child, followed by a meeting between the consultant and parent or teacher. During this meeting time, results of the direct observation were discussed, focusing on occurrences and rates of target behaviors, integrity of intervention implementation, and perceived effectiveness of the intervention since the previous meeting. Consultants to children who were assigned to the MCI condition received weekly supervision regarding assessment, intervention, and consultation.

**Data analysis.** The following statistical analysis procedures were utilized to compare observational data over time between intervention groups, and the effect of the predictor variables on dependent measures over time. Data were analyzed via separate hierarchical linear model analyses, comparing the growth over time, comparing the effects of treatment group, initial ODD status, level of aggressive behavior observed at baseline, and age at enrollment on the following dependent variables: parent and teacher ratings of social skills, and observations of social interactions with peers in the school setting. These analyses were selected due to the interest in measuring developmental change over time, the ability of this model to address the dependence of observations, and its flexibility in maintaining maximum data, given the missing data that occurs in a longitudinal study (Hox, 2000; Schnabel, Little, & Baumert, 2000). For the purposes of the present study, the Parent and Teacher SSRS and the behavioral observation data from the intervention phases were analyzed for a total of six possible data points (baseline, mid-first year, end of first year, mid-second year, end of the second year, and end of the third year). The raw scores of the SSRS forms were utilized in data analysis as

participants' age into the normative population of the elementary forms over the course of the study; therefore, standard scores for the early data collection phases could not be calculated. Any participant who has two or fewer data points was eliminated from the analyses, due to the weaknesses in establishing a growth curve with fewer data points.

The individual variables to be analyzed include the ODD diagnostic status, aggression, and age. For the purposes of the present investigation, ODD status was defined as meeting criteria for ODD on the parent DISC interview at baseline.

Aggression was defined as exhibiting at least one act of negative physical behavior during the baseline ESP observation. For analysis by age, the participants were divided dichotomously based on the group mean. For all comparisons, t-tests and Chi-square analyses revealed that groups did not vary significantly on the basis of assigned treatment group, ethnicity, gender, or DAS score. The ADHD/agr and ADHD only groups did not vary significantly on their ODD diagnostic status, nor did the older participants when compared to younger participants.

The hierarchical linear model is an extension of a multiple regression model. The multiple regression model, assumes linearity (that change between scores remains constant), normality (that the variables fit the general pattern of the normal curve), homoscedasticity (that the variance in variables remains constant), and independence (that the errors associated with the variables are not correlated); however, these assumptions are violated when data is hierarchical (Chou, Bentler, & Pentz, 2000). Research in the field of education often utilizes a hierarchical structure, such as when students in different classrooms receive different interventions. In this example,

individual students' outcomes were related not only to their treatment conditions, but also to their classroom assignment.

Repeated measures models also take a hierarchical structure. In this example, however, the dependent data existed within an individual, rather than a group. Follow-up data were related not only to the treatment condition the individual received, but also to the baseline measurement. When these violations of the standard multiple regression model are not considered in data analysis, the analysis becomes more likely to yield inaccurate results. Specifically, type I errors, that a true null hypothesis will be rejected, increase (Chou, Bentler, & Pentz, 2000).

In those cases in which data from at least three time points was available, individual regression equations were calculated. Since the unit of analysis for the second level model becomes the regression line or curve, the hierarchical linear model allows individuals to have varying numbers of data points, collected at varying intervals. Permitting the use of all data collected, rather than eliminating cases with incomplete data, allows for increased validity in these analyses (Wothke, 2000). Additionally, the focus on the overall picture of individual change over time offers a conceptual improvement over those models, such as repeated measures ANOVA, which compare change only on pre- and post-treatment measures.

At the first level, a simple, unconditional model with no predictors was analyzed in order to model individual growth over time. At the second level, the effects of group membership and initial characteristics were evaluated to determine experimental effects. The model that was employed to examine the effects of these variables on informant



ratings of social skills and behavioral observations of social interactions in the classroom follows:

$$\text{Level 1: } Y_{ij} = \beta_{0j} + \beta_{1j} + r_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}X_i + u_{0j}$$

$$\beta_{1j} = \gamma_{01} + \gamma_{11}X_i + u_{1j}$$

That is, observed or rated social behavior at time “i” for individual “j” is a function of the relationship among an individual intercept or initial level of behavior, an individual slope or change over time, and error. At level 2 of the model, in which the explanatory variables ( $X$ ) of treatment group, baseline ODD status, observation of aggressive behavior at baseline, and age of the child at enrollment, are added, individual intercepts are predicted by the effects of group intercept, the difference between intercepts, group membership, and residual error, in order to answer whether the parameters of the growth curve were related to group membership and the individual characteristics of young children at the time of their enrollment in the project.

## Results

The mean and standard deviation for each of the dependent measures over time are presented in Table 3. Due to the longitudinal nature of the study, data for all participants at all data points was not able to be collected. For the observational measures, the data from 100 participants was utilized. For the parent and teacher reports, 83 and 95 participants, respectively, had sufficient data for analysis. Additionally, ODD status for two participants was not available and six baseline observations were not conducted, thus further reducing the sample sizes for the models exploring these variables.

Table 3: Means and standard deviations for outcome measures across treatment groups

Measure	Baseline	1	2	3	4	5
ESP Negative Verbal *	1.17 (2.377)	1.23 (2.743)	1.18 (2.963)	0.61 (1.263)	0.75 (2.192)	0.26 (.587)
ESP Negative Physical*	0.94 (1.683)	0.88 (1.752)	0.90 (1.883)	0.74 (1.639)	0.51 (1.187)	0.52 (1.518)
ESP Disruptive Behavior*	1.52 (2.667)	1.09 (2.108)	0.72 (2.319)	0.42 (1.096)	0.26 (.880)	0.14 (.472)
SSRS Social Skills (Parent)**	39.07 (9.325)	44.07 (8.844)	45.89 (9.374)	47.56 (9.692)	48.82 (9.797)	48.09 (9.790)
SSRS Social Skills (Teacher)**	26.12 (8.305)	30.52 (9.286)	33.03 (10.802)	33.94 (10.225)	31.87 (9.528)	32.32 (10.377)

\* ESP - *Early Screening Project Social Observation Code*, frequency count reported

\*\* SSRS – *Social Skills Rating Scale*, raw scores reported

Separate hierarchical linear modeling (HLM) analyses for each dependent variable were used to assess growth over time and differential predictors of change over two years of intervention and a one-year post-intervention follow-up. At the first level, individual growth trajectories were calculated for each participant. At level two, grouping parameters of individual change were examined, including mean initial performance and mean growth rate. The intercept for all dependent measures was statistically significant, indicating that the initial level for all participants was significant from 0 (Table 4). Further, statistically significant growth, indicated by  $\beta_{10}$ , was obtained for all dependent measures. On the teacher and parent ratings of social skills, growth in slopes was observed, revealing an overall improvement in the participants' rated social skills. On the observational measures, negative slopes were observed, revealing significant decreases in observed problem behaviors.

Table 4: Simple model

Dependent Measure	Mean Intercept ( $\beta_{00}$ )	Mean Slope ( $\beta_{10}$ )	Effect Size for Change from Baseline to 36 Mo.
ESP Negative Verbal	1.30**	-0.20**	-0.41
ESP Negative Physical	0.97**	-0.10*	-0.17
ESP Disruptive Behavior	1.41**	-0.30**	-0.60
SSRS Social Skills (Parent)	40.16**	2.08**	0.59
SSRS Social Skills (Teacher)	27.04**	1.41**	0.46

\* $p < .05$ . \*\* $p < .01$

### Group membership

When classroom observations and informant reports were analyzed by comparing treatment group (MCI vs. PE),  $\gamma_{00}$  was statistically significant ( $p < .01$ ), revealing that the PE's group's baseline behavior and ratings were significantly different from 0 (Table 5). When teacher ratings of social skills on the SSRS were analyzed, the MCI and PE groups differed at baseline,  $F(1, 124) = 4.61, p < .05$ . For all remaining dependent measures,  $\gamma_{01}$  was not statistically significant, indicating that there were no statistically significant differences between groups at baseline. Repeated measurement of negative verbal behavior and negative physical behavior over time failed to reveal statistically significant change ( $p = .39, p = .51$ , respectively). All remaining dependent observations and informant reports revealed that  $\gamma_{10}$  reached significance ( $p < .01$ ), indicating statistically significant growth over time. No group differences ( $\gamma_{11}$ ) reached significance, indicating that both the MCI and PE groups exhibited comparable rates of change over the course of intervention. Slopes for all observational measures were negative, indicating a decrease in challenging behaviors; slopes for all informant reports were positive, indicating a perceived increase in social skills.

Table 5: Growth model estimates for observations and informant report by treatment group

	Mean Intercept	Difference in	Mean Growth	Difference in
Measure	PE ( $\gamma_{00}$ )	Intercept ( $\gamma_{01}$ )	Rate PE ( $\gamma_{10}$ )	Growth ( $\gamma_{11}$ )

Neg verbal	1.42**	-0.28	-0.13	-0.05
Neg physical	1.03**	-0.12	-0.06	-0.05
Disruptive bx	1.22**	0.34	-0.25**	-0.09
Parent SSRS	40.87**	-1.26	1.94**	0.22
Teacher SSRS	29.58**	-3.01*	1.40**	0.14

\* $p < .05$ . \*\* $p < .01$

Note: Parent Education serves as the reference group.

As positive growth was obtained for both the PE and MCI treatment groups, supporting the earlier findings of Kern and colleagues (2007) and DuPaul and colleagues (in press), participants were combined for subsequent analyses, as in DuPaul, Kern, Gormley, and Volpe (2011).

## ODD

When observations of school behavior and teacher reports were analyzed by comparing ODD status (ADHD/ODD vs. ADHD only),  $\gamma_{00}$  was statistically significant ( $p < .01$ ), revealing the ADHD/ODD group's baseline behavior and ratings were significantly different from 0 (Table 6). Similarly, for observations of school behavior and teacher reports,  $\gamma_{01}$  was not statistically significant, indicating that there were no statistically significant differences between groups at baseline. All observations and teacher reports revealed that  $\gamma_{10}$  reached significance ( $p < .01$ ), indicating statistically significant growth over time. No group differences ( $\gamma_{11}$ ) for observations of school behavior and teacher reports reached significance, indicating that both the ADHD/ODD

and ADHD only groups exhibited comparable rates of change over the course of intervention. Slopes for all observational measures were negative, indicating a decrease in challenging behaviors; slopes for all informant reports were positive, indicating a perceived increase in social skills.

When parent ratings of social skills were analyzed by comparing comorbid diagnosis (ADHD/ODD vs. ADHD only), results indicated significant group differences at intercept on the parent rating measure, with the ADHD/ODD group having a mean intercept of 38.96, and the ADHD only group having a significantly higher mean intercept of 44.16. Similarly, the average rate of change over time indicated significant group differences,  $F(1, 81) = 5.63, p < .05$ . The mean growth rate for the ADHD/ODD group was 2.45 raw score points improvement per data collection interval. The ADHD only group improved 0.92 points per interval. When the effect sizes for change in parent reports over time from baseline were calculated for the ADHD/ODD and the ADHD only groups, a large effect size was found for the ADHD/ODD group ( $ES = 1.10$ ) and a moderate effect size for the ADHD only group ( $ES = 0.41$ ).

Table 6: Growth model estimates for observations and informant report by ODD classification

Measure	Mean Intercept ( $\gamma_{00}$ )	Difference in Intercept ( $\gamma_{01}$ )	Mean Growth Rate ( $\gamma_{10}$ )	Difference in Growth ( $\gamma_{11}$ )
Neg verbal	1.30**	0.05	-0.21*	0.03
Neg physical	1.01**	-0.21	-0.14**	0.18
Disruptive bx	1.30**	0.47	-0.27**	-0.09

Parent SSRS	38.96**	5.20**	2.45**	-1.53*
Teacher SSRS	28.09**	0.09	1.49**	-0.53

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\* $p < .05$ . \*\* $p < .01$

Note: ADHD/ODD serves as the reference group.

### **Aggression**

When observations of school behavior and informant reports were analyzed by comparing the presence or absence of any incidents of negative physical behavior at baseline (ADHD/agr vs. ADHD only),  $\gamma_{00}$  was statistically significant ( $p < .01$ ), revealing the baseline behavior and ratings of the ADHD/agr group were significantly different from 0 (Table 7). When observations of negative physical behavior were analyzed by comparing the presence of negative physical behavior at baseline (ADHD/agr vs. ADHD only), groups differed as expected at baseline,  $F(1, 93) = 31.57, p < .0001$ . For all remaining dependent measures,  $\gamma_{01}$  was not statistically significant, indicating that there were no statistically significant differences between groups at baseline. All dependent observations and informant reports revealed that  $\gamma_{10}$  reached significance ( $p < .01$ ), indicating statistically significant growth over time. When observations of negative physical behavior over time were analyzed by comparing the presence of negative physical behavior at baseline (ADHD/agr vs. ADHD only), groups differed in average rate of change over time,  $F(1, 93) = 15.23, p < .001$ . The mean rates of change for the ADHD/agr and ADHD only group were -0.31 and 0.05 per data collection interval, with the ADHD only group maintaining a near zero level of occurrence. When the effect sizes for change in observations of over time from baseline were calculated, a large effect size

was found for ADHD/agr group ( $ES = -0.86$ ). The ADHD/agr group demonstrated a large, significant decrease in these behaviors over time with intervention, while the ADHD only group maintained a near 0 level of occurrences over time. No remaining group differences ( $\gamma_{11}$ ) reached statistical significance, indicating that participants exhibited comparable rates of change over the course of intervention, whether or not they displayed negative physical behavior at baseline. Slopes for all remaining observational measures were negative, indicating a decrease in challenging behaviors; slopes for all informant reports were positive, indicating a perceived increase in social skills.

Table 7: Growth model estimates for observations and informant report by presence of negative physical behavior at baseline

Measure	Mean Intercept ( $\gamma_{00}$ )	Difference in Intercept ( $\gamma_{01}$ )	Mean Growth Rate ( $\gamma_{10}$ )	Difference in Growth ( $\gamma_{11}$ )
Neg verbal	1.72**	-0.71	-0.26**	0.06
Neg physical	1.81**	-1.46**	-0.31**	0.36**
Disruptive bx	1.80**	-0.66	-0.40**	0.17
Parent SSRS	39.97**	0.15	2.19**	0.03
Teacher SSRS	26.44**	2.69	1.58**	-0.57

\* $p < .05$ . \*\* $p < .01$

Note: ADHD/agr serves as the reference group.

## Age



In order to explore the effect of earlier intervention on the data, the sample was divided dictoemously by group mean. The younger age group was under 53 months old ( $n=63$ ), and the older age group was 54 months or older ( $n=72$ ). The average age of the younger group was 47 months old, and the average age of the younger group was 60 months old. When observations of school behavior and informant reports of social skills were analyzed by comparing age (older vs. younger participants),  $\gamma_{00}$  was statistically significant ( $p<.01$ ), revealing the older participants' baseline behavior and ratings were significantly different from 0 (Table 8). For all dependent measures,  $\gamma_{01}$  was not statistically significant, indicating that there were no statistically significant differences between groups at baseline. Repeated measurement of negative physical behavior over time failed to reveal statistically significant change ( $p=.07$ ). All remaining dependent observations and informant reports revealed that  $\gamma_{10}$  reached significance ( $p<.01$ ), indicating statistically significant growth over time. No group differences ( $\gamma_{11}$ ) reached significance, indicating that children of all age groups exhibited comparable rates of change over the course of intervention. Slopes for all observational measures were negative, indicating a decrease in challenging behaviors; slopes for all informant reports were positive, indicating a perceived increase in social skills.

Table 8: Growth model estimates for observations and informant report by participants' age

	Mean Intercept	Difference in	Mean Growth	Difference in
Measure	( $\gamma_{00}$ )	Intercept ( $\gamma_{01}$ )	Rate ( $\gamma_{10}$ )	Growth ( $\gamma_{11}$ )
Neg verbal	1.15**	0.26	-0.17*	-0.03

Neg physical	0.81**	0.31	-0.10	0.00
Disruptive bx	1.10**	0.57	-0.26**	-0.06
Parent SSRS	41.74**	-3.15	1.80**	0.53
Teacher SSRS	27.72**	0.58	0.93*	0.94

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\* $p < .05$ . \*\* $p < .01$

Note: The older half of participants serves as the reference group.

## **Discussion**

The first hypothesis of the present study, that children who participated in the MCI intervention would demonstrate fewer antisocial behaviors over time and greater increases in parent- and teacher-rated social skills over time, in comparison to the PE group, was not supported by the findings of the present study. Rather, extending the initial findings of Kern and colleagues (2007) and DuPaul and colleagues (in press) into the post-intervention years of the study, participants from both treatment groups exhibited significant and comparable improvements. Further, exploring the results of standardized behavior observations during free play in the classroom setting, both those children who participated in the MCI intervention and those in the PE intervention demonstrated significant decreases over time in occurrences of disruptive behavior. Statistically significant change was not obtained for negative verbal behavior or negative physical behavior. As no differences between treatment groups were discovered, participants were combined for subsequent analyses.

Exploring individual factors that could influence response to behavioral intervention, the majority of findings from the present study did not support hypotheses. In the remaining analyses, which compared participants by the presence or absence of comorbid Oppositional Defiant Disorder (ODD), the presence or absence of aggression during baseline observation, and age at enrollment, significant improvements over time were consistently revealed; however, group differences typically did not emerge. Observations of negative verbal behavior, negative physical behavior, and disruptive behavior generally revealed significant decreases over the three years of the study, and informant ratings of social skills generally revealed significant increases over time.

Significant group differences in rates of change over time were revealed in only two analyses.

First, parent ratings of social skills on the *Social Skills Rating System* (SSRS) revealed group differences at baseline and over time, when comparing an ADHD/ODD group and an ADHD only group. Children in the ADHD only group were rated as exhibiting higher levels of social skills at baseline, compared to those in the ADHD/ODD group. Over time, however, children in the ADHD/ODD group demonstrated a greater rate of improvement over time on parent ratings of social skills, than did those in the ADHD only group.

Second, when comparing rates of change for observations of negative physical behavior during free play in the school setting between children who demonstrated these behaviors at baseline and those who did not, children in the ADHD/agr group exhibited a significant decrease in these behaviors over time, and those in the ADHD only group maintained a near-zero level of occurrence.

The failure of the present investigation to reveal treatment group differences across markedly different intensities of interventions, and many individual factors, provides further support to the hypotheses offered by Kern and colleagues (2007). Specifically, group equivalence on outcome measures may be attributable to the fact that many parents in the multi-setting, multi-component, function-based intervention group did not receive the full intervention, or that the interventions were truly equally effective. Further, as noted in Kern and colleagues (2007), the absence of a true control group does not allow for determination whether parent education is truly as effective as the MCI intervention, or whether the lack of group differences can be attributed to time or

maturation effects. Based on prior investigations of the course of ADHD in preschool children, however, maturation effects are somewhat unlikely. Lahey and colleagues (2004) found that 4-6 year old children who met criteria for ADHD continued to meet criteria for ADHD diagnosis for three subsequent years of the investigation, and continued to demonstrate significant social impairments, as measured by peer social preference.

The use of a control group or a wait-list control group is not recommended, due to the ethical concerns of withholding intervention from an at-risk population. A matched, non-diagnosed comparison group, in contrast, would provide information regarding the patterns of social skills development in a typical population, as well as the severity of deficits present in the diagnosed group, relative to their typical peers.

Contrary to an explanation offered by Kern and colleagues (2007), and supporting the findings of DuPaul and colleagues (in press) however, the present study has eliminated the possibility that group differences would emerge over an extended period of intervention. Unlike the findings of Shaw, Dishion, Supplee, Gardner, and Arnds (2006) who founds significant differences two years post-intervention, the present study appears to lend more support to the findings demonstrated by the Multisite Multimodal Treatment Study of Children with ADHD (MTA), finding maintained or decreasing effect eight years post-intervention (Molina et al., 2009). One possibility for this difference is the use of a community control group in the present study and the MTA, thus all participants received at least some behavioral intervention. Given the patterns of social interaction and ADHD symptoms demonstrated in the literature (Colton & Sheridan, 1998; Landau & Milich, 1990), it is possible that a true control group would

demonstrate deteriorating behavior over greater lengths of time, leading to a greater significant difference between groups; however, due to the inherent ethical concerns of this hypothesis, such investigation is discouraged. Compared to non-diagnosed, matched controls, preschoolers with ADHD demonstrated consistent impairments in the classroom and with peers over the course of a four year investigation (Lahey, Pelham, Loney, Kipp, Erhardt, Lee, et al., 2004). Despite pharmacological intervention in a population of preschoolers with ADHD, and decreased symptom severity during the first three years of a longitudinal study, these improvements reached a plateau and remained in the moderate to severe range during the subsequent three years (Riddle, Yershova, Lazzaretto, Paykina, Yenokyan, Greenhill, et al., 2013). Indeed, a full 89% of participants continued to meet criteria for ADHD and significant impairment at the end of the sixth year of the study (Riddle et al., 2013).

The two statistically significant findings of the present investigation, exploring individual factors as predictors of change, offer a degree of promise regarding intervention efficacy, but also concerns regarding their validity and reliability.

First, considering differences between groups at baseline, only parent ratings of social skills discriminated between the ADHD/ODD and ADHD only groups at baseline. No differences were discovered between these groups on teacher ratings of social skills, or on the observational measures of negative verbal behavior and disruptive behavior. Regarding the differences in rates of change over time between the ADHD/ODD and ADHD only groups on parent ratings of social skills, these ratings are open to bias effect, particularly as the parents were participants in the study (Lett & Kamphaus, 1992; McConaughy, 1993; Merrell, 2000; McEvoy et al., 2003; Nolan & Gadow, 1994).

Without corroborating changes in teacher ratings or observational measures, this finding must be interpreted cautiously. It is of interest that the independent variable, ODD diagnostic status, was defined by parent interview, and that a significant difference between groups was revealed in parent report of social skills. This significant finding, therefore, may reflect more about parent perception than actual changes in social skills or behaviors.

The finding that children who exhibited negative physical behavior at baseline demonstrated statistically significant decreases in these behaviors, across intervention groups, is extremely promising for the behavioral outcomes for these children. As noted by Cantwell (1996), aggression is one of the observable behaviors associated with a persistent course of ADHD over time. Further, given Bagwell and Coie's (2001) finding that non-aggressive boys engaged in more positive engagement, reciprocity, and on-task behaviors, positive social outcomes are likely. It is important to note, however, that this decrease in a specific antisocial behavior was not accompanied by an increase in informant ratings of social skills, despite the findings in a previous investigation of these data that revealed a strong correlation between teacher ratings and observations of aggressive behavior at baseline (Thomas et al., 2011). Although this brings these positive findings into question, it reiterates the need for a combination of both observational measures and rating scales as best practice in the assessment of ADHD, particularly for low frequency but salient behaviors such as aggression (Barkley, 1998; Thomas et al., 2011).

Perhaps most importantly, the findings in the present study provide support to the concept of early intervention, prior to the development of an extended reinforcement

history. Even minimal, community-based parent education results in significant decreases in antisocial behaviors during free play in preschool settings, and significant increase in parent- and teacher-rated social skills. These findings stand in contrast to Quinn and colleagues (1999), whose meta-analysis revealed no group differences and often negative trajectories for social skills in older children with emotional and behavioral disorders. Viewed in light of previous research that revealed that if children who were rated as “hard to manage” at age three demonstrated behavioral improvements by age six, they were indistinguishable from the control group (Campbell & Ewing, 1990), these findings offer significant promise for children at risk for ADHD. All groups showed improvements on informant ratings of social skills and in observations of antisocial behavior. If these improvements are associated, as would be expected, with decreased social difficulty and peer rejection, the negative long-term outcomes for children with ADHD and social impairments, such as school dropouts, delinquent or criminal behavior, and the development of mental health difficulties, may also be avoided (Bagwell et al., 2001; Colton & Sheridan, 1998; Landau & Milich, 1990).

Further, the present investigation offers support for intervention delivered by those individuals in young children’s natural environments, as recommended by Gresham and colleagues (2001). Even with the varied intensity of the present interventions, across parent education and multi-setting, function-based, behavioral consultation groups, these positive findings offer an alternative to the more frequently investigated pharmacological intervention (Ghuman et al., 2008), and add to the literature supporting parent education, including increases in parent and teacher rated social skills (Sheridan et al., 1996), decreases in ADHD symptoms (Canu & Bearman, 2011; Jones, Daley, Hutchings,



Bywater & Eames, 2008; Sonuga-Barke et al., 2001), and decreases in conduct problems or disruptive behavior (Canu & Bearman, 2011; Scott, Sylva, Doolan, Price, Jacobs, Crooks, et al., 2010; Shaw, Dishion, Supplee, Garner, & Arnds, 2006). The key to this finding may be the ability to intervene at the moment of behavior and a decreased need to specifically program for generalization from an artificial setting (Gresham et al., 2001; Pfiffner, Kaiser, Burner, Zalecki, Rooney, Setty, et al., 2011; Rajwan, Chacko, & Moeller, 2012).

### **Limitations**

The findings of the present investigation are constrained by the limitations of the larger study in general, as delineated by Kern and colleagues (2007) and reviewed earlier in this discussion, including a lack of a true control group, and the failure to implement the full MCI intervention in many cases. The present investigation is further limited by additional factors.

First, particularly related to observation measures, the low levels of behaviors observed limit the present study. Across groups, at baseline, the mean number of negative verbal incidents over the 20-minute observation was 1.17. The mean number of negative physical behavior was 0.94 at baseline, and the mean number of incidents of disruptive behavior was 1.52. Post-intervention, the mean number of negative verbal incidents over the 20-minute observation was 0.26. The mean number of negative physical behavior was 0.52 post-intervention, and the mean number of incidents of disruptive behavior was 0.14. Whether this change indicates meaningful change in the social interactions of young children with ADHD remains unanswered.

Relatedly, utilizing only data from one 20-minute observation and a low threshold of one incident of physical aggression to define an independent variable is a limitation to the ability to draw conclusions from these significant findings. Indeed, significant variance among the intercepts of those participants in the ADHD/agr group was revealed, indicating that a wide range of aggressive incidents at baseline was measured. Utilizing a more stringent criteria for identification of aggressive students, such as multiple data points or sources of data may elucidate the manner in which this population responds to various interventions.

It is also possible that the reduction in incidents of negative physical behavior in the ADHD/agr group represents regression toward the mean, rather than a socially valid improvement. Given the large variance in baseline levels and failure to corroborate this improvement on other measures, such as informant report, the interpretation of this finding beyond a statistical anomaly must be done with significant caution.

Further, current analysis of informant reports was based on raw scores from the parent and teacher ratings on the SSRS. Although this permitted for the use of a single measure over the time of the study, without calculating normative scores, it is unknown whether these measured improvements in social skills represent adequate levels of functioning compared to typical children. Similar to the limitations discussed regarding the observational measure, significant variance was discovered among the intercepts of the ADHD/ODD group and the ADHD only group, as well as the slopes of the ADHD/ODD group. Therefore, although the findings indicate significant differences between the means slope and intercepts of the groups, the independent variable of comorbid ODD does not explain the outcome variable of parent reported social skills.

A further limitation is the failure to calculate the internal consistency of parent and teacher ratings on the SSRS. This is of particular importance as parents and teachers were often utilizing a measure normed for an older population of children than the ones they were rating.

Despite these weaknesses, the present study offers the field areas for further investigation. First, to address earlier limitations regarding utilizing parent report for both independent and outcome variables, research regarding the relationship between parent perceptions of efficacy in dealing with behavioral challenges and their ratings of behavior could provide further insight into the significant results regarding the relationship between ODD diagnostic status and parent-rated social skills. Further research is also warranted regarding the percentage of those children who continued to meet criteria for ODD at the end of intervention or follow-up, the normative level of social skills ratings following intervention, and the impact of decreased antisocial behavior on social rejection and peer acceptance. Gresham and colleagues (2001) emphasize the need to assess socially important outcomes. Although the present investigation offers promise regarding improvements in social skills across groups, as measured by direct observations and informant report, it remains unknown whether these improvements translate to socially important change in peer acceptance and friendships.

Finally, given the promising findings of response to even minimal, indirect intervention such as parent education, research is warranted investigating the efficacy of a tiered, behavioral, early intervention model, such as that proposed by Kern and colleagues (2007), and Reid and Eddy (2002) in their efforts with older, school-age children. The current investigation indicates that baseline characteristics, such as ODD

diagnosis and physical aggression, do not necessarily indicate the need for an initial intense intervention, as suggested by DuPaul and colleagues (in press). Rather, as groups with these characteristics did exhibit rates of change comparable to their peers with ADHD only, a tiered model emphasizing response to intervention requires investigation. An exploration of such a model, particularly with a preschool population, might begin with a parent education and training tier, as supported by the research of Webster-Stratton et al. (2011), Kern et al. (2007), and Sonuga-Barke et al. (2001), and progress to a more intense tier, incorporating individual, functionally-based, multi-setting intervention for those children who are not demonstrating improvements on socially important outcomes, such as peer rejection and friendship (Gresham et al., 2001; Stormont, 2001).

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**EDUCATION**

Lehigh University: Bethlehem, PA

*M.Ed.: Human Development, January 2004*

*Doctoral Candidate in School Psychology*

PA certified Educational Specialist - School Psychologist, August 2006

Chestnut Hill College: Philadelphia, PA - Counseling Psychology coursework, 2000-02

Colgate University: Hamilton, NY - *B.A.: Psychology and English cum laude, May 1998*

**EXPERIENCE**

Easton Area School District: Easton PA, *School Psychologist, Aug 2008-present*

Conducting psycho-educational evaluations and reevaluations for students from kindergarten-entry through high school; consulting with special education and regular education teachers; completing Functional Behavior Assessments; coordinating with administration to revise district policies on the identification of gifted students

Colonial Intermediate Unit 20: Easton PA, *School Psychologist, Aug 2007-Jun 2008*

*School Psychologist, Intern, Aug 2006-Jun 2007*

Conducting psychoeducational assessments and reevaluations for students from early intervention programs through high school; consulting with special education and regular education teachers; completing Functional Behavior Assessments (FBAs); developing individualized behavioral and academic intervention plans; consulting with parents, special education teachers, and community preschool teachers of preschool-age children eligible for early intervention services; facilitating parent/educator education sessions

Lehigh University, College of Education: Bethlehem, PA, *Project ACHIEVE Consultant, Jun 2002-Aug 2006*

Providing early intervention consultation for teachers and parents of preschoolers exhibiting behaviors associated with Attention Deficit Hyperactivity Disorder (ADHD): teaching parent education sessions; conducting assessment interviews, direct observations, and functional assessments; developing individualized behavioral and academic intervention plans; conducting recruitment efforts through local early childhood education centers and physicians' offices

Allentown School District: Allentown, PA, *Doctoral Practicum, Sept 2005-Jun 2006*

Conducting psycho-educational assessments; consulting with special education teachers; participating in Instructional Support Team (IST) meetings

Wilson Area School District: Wilson Boro, PA, *Doctoral Practicum, Aug 2004-Apr 2005*

Conducted psycho-educational assessments, assisting in the development of Individualized Educational Programs (IEPs); consulted with teachers, parents, and staff psychologists